

**NATIONAL HEALTH SERVICE CORPS EDUCATIONAL PROGRAM  
FOR CLINICAL AND COMMUNITY ISSUES IN PRIMARY CARE**

**ORAL HEALTH MODULE**

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## **SUBTOPIC 1**

### **ORAL MANIFESTATIONS OF HIV/AIDS**

#### **TIMELINE (55 minutes)**

5 min	Introduction/Ice Breaker
5 min	Review of Objectives/Format
15 min	Overview
20 min	Review of Case/Questions
10 min	Additional Questions and Answers

#### **SECTION 1 LEARNING OBJECTIVES**

Target Group: Nurse practitioners, physician assistants, physicians, medical students, residents, and practicing clinicians.

By the end of this discussion, participants should:

1. Identify the various common oral diseases and conditions that affect the oral cavity of HIV-infected patients
2. Conduct a thorough oral examination for the detection of lesions that frequently affect HIV-infected patients
3. Instruct patients on how to examine their own mouths for the detection of abnormalities
4. Provide advice to HIV-infected patients on how to care for their mouths and teeth in order to minimize oral manifestations of HIV/AIDS
5. Identify suitable categories of medications to treat or alleviate the effects of various common oral diseases that affect HIV-infected patients

## SECTION 2 ICE BREAKER

This exercise is designed to sensitize participants to the importance of certain oral abnormalities as possible indicators of HIV infection. Participants gain experience in urging patients to be tested for HIV status, preceded by pre-test counseling.

Two volunteers enact a role-play. One plays a primary care provider who has detected some creamy white plaques on the mucosa of the cheeks and tongue of a 15-year-old who has come to an urban clinic for an unrelated reason, such as a possible bone fracture. The other volunteer portrays the teenager who, after questioning, reveals that he is a runaway who lives with a group of other runaways and frequently engages in male prostitution.

Other participants critique the role-playing exercise.

Key points to emphasize include:

- Some of the first conditions associated with HIV infection occur in the oral cavity of persons who are otherwise symptomless.
- Young persons are likely to believe they are invulnerable to HIV infection.
- It is essential that *all* persons who engage in unsafe sexual practices be tested for HIV infection and be counseled on methods of safe sex.

Remember, cultural issues may play a role. A patient may be unwilling or reluctant to openly discuss sexuality, sexual practices, or practices that may not be legal, and he or she may provide incomplete or misleading information. Gender, age, sexual orientation, race, ethnicity, or cultural beliefs about HIV, HIV transmission, and AIDS, and provider response to such beliefs, also may influence the effectiveness of patient-provider interactions.

### **SECTION 3 OVERVIEW**

The oral cavity provides a unique micro-environment normally exposed to a host of microbes that rarely produce problems. In immunosuppressed individuals infected by HIV, these organisms may produce frequent and serious conditions that require medical attention. Some of the earliest opportunistic diseases and infections associated with HIV infection occur in the oral cavity, such as candidiasis and neoplasms, particularly non-Hodgkin's lymphoma and Kaposi's sarcoma. The presence of oral lesions often is used as an indication for initiating anti-viral therapy.

Because a far higher proportion of Americans visit a medical facility in any year than a dental clinic, primary care providers play an important part in early detection of HIV infection, initial immunosuppression, and AIDS. A thorough examination of the oral cavity by all health professionals is instrumental. All primary medical care providers have a responsibility to be alert for the detection of diagnostic signs and to ensure that patients are referred for definitive diagnosis and proper care.

Although transmission of HIV infection can occur from parenteral exposure to infected body fluids, such transmission is uncommon. HIV is rarely found in saliva. Moreover, some evidence indicates that a salivary protein (SLPI) inhibits HIV replication and infection. Adherence to recommended infection control procedures for *all* patients, particularly the use of gloves and disinfection principles, essentially eliminates the risk of HIV transmission from examination or treatment procedures within the oral cavity.

#### **Common HIV-Related Oral Conditions**

Candidiasis, occasionally called thrush, is a fungal infection that is the most common and earliest oral feature of HIV infection. It may be predictive of HIV infection and subsequent development of AIDS. The pseudomembranous form of oral candidiasis is characterized by the presence of creamy white or yellowish plaques on reddened or normal-colored mucosa. Removal of the plaque by scraping often reveals a bleeding surface. This type of candidiasis may occur on any mucosal surface.

Erythematous forms of candidiasis also occur; they usually look more benign than the pseudomembranous form because they lack characteristic plaques. Hyperplastic candidiasis consists of large areas of coalesced plaques that cannot be scraped off the mucosa. This type occurs only in severely immunosuppressed individuals. Angular cheilitis is another form of candidiasis. The disease may be treated with topical or systemic antifungal agents but tends to recur.

Kaposi's sarcoma (KS) may occur only in the mouth or in association with skin, visceral, or lymph node lesions. It is common for the first lesions of KS to appear in the mouth. Oral KS lesions may be red, blue, or purple and may be flat or raised and solitary or multiple. KS lesions are usually flat and painless unless infected, but nodular forms produce symptoms. They tend to occur on the

palate or gingival tissue. Treatment for aggressive lesions includes radiation, chemotherapy, and/or laser surgery.

Oral hairy leukoplakia, which is found predominantly on the lateral margins of the tongue, was first discovered in 1981 among male homosexuals in San Francisco. It occurs, however, among all risk groups. The whitish patches, which cannot be wiped away, tend to be painless and usually are not treated, because treatment does not affect prognosis.

Various viral lesions may occur in the mouths of HIV-positive patients. Human papilloma viruses cause warts, which may occur in groups anywhere in the mouth. Their appearance may range from small, white, or pink cauliflower-like growths to large raised areas. They may be painful and troublesome if they interfere with mastication. Herpes simplex virus may produce recurrent episodes of painful ulcerations in the mouths and on the lips. Herpes zoster, caused by the chicken pox virus, also produces painful oral ulcerations, usually accompanied by characteristic skin lesions.

HIV-infected persons may also present with characteristic gingivitis, periodontal diseases and necrotizing stomatitis. Unlike conventional gingivitis and periodontal diseases that respond to standard periodontal therapy (i.e., removal of calculus deposits by scaling beneath the gums and thorough, regular plaque removal), HIV-associated periodontal disease may not respond to these regimens. Gum tissues may be sore and bleed easily, even with good oral hygiene practices. Frequently, this periodontitis progresses rapidly and affects bone beneath the gum, necessitating multiple tooth extraction. Affected patients require thorough and frequent deep scaling of tooth surfaces and must practice meticulous home care. Antimicrobial rinses and antibiotics may help.

Often, HIV-infected persons realize that something is wrong in their mouths by an awareness of a bad odor and taste, and evidence of nocturnal gingival bleeding (pillow bloodstains). HIV-infected patients may be affected by dry mouth (xerostomia) and/or salivary gland enlargement. The xerostomic condition often is a side effect of some medications prescribed for HIV-infected patients.



## SECTION 4 CASE STUDY/DISCUSSION QUESTIONS

Charles, a 32-year-old male, visits your clinic. He has been a patient for about three years and has sought treatment mostly for minor accidents and respiratory infections. His chief complaint this time is several painful white, yellow, and red patches on the roof of his mouth and tongue that have not cleared up during the previous two weeks. You suspect candidiasis (thrush), one of the oral signs of HIV infection.

During your exam, you observe that a couple of fillings seem broken, that another tooth seems to have a cavity, and that the gums around some teeth seem inflamed. Charles has been married for eight years but, by intensive questioning, you learn that he has had sexual intercourse with several women for five years, usually during business trips. Some were prostitutes. He has not routinely used a condom. His HIV status has not been tested.

1. What general medical history questions would you ask Charles to help confirm your suspicion that he is immunosuppressed and may be HIV-positive?
2. What oral medical history questions would you ask Charles to determine the extent of his oral health problems?
3. What advice would you give Charles concerning dental care, and what instructions would you provide for self-examination of his oral cavity?
4. What treatment can you suggest to treat Charles' candidiasis or other oral problems that may develop?

## SECTION 5 SUGGESTED ANSWERS

1. *What general history questions would you ask Charles to help confirm your suspicion that he is immunosuppressed and may be HIV-positive?*

You should obtain a thorough medical history. Ask about hepatitis, recurrent illnesses or infections, and unintentional weight loss. Inquire whether Charles recalls experiencing an acute infection within the past few years that resembled flu or mononucleosis, accompanied by malaise, fever, and enlarged lymph nodes, from which he seemed to recover completely.

Charles should be asked whether he is aware of any recent evidence of neurological impairment, which may include subtle cognitive changes, failure of various neurological functions, or signs of dementia. Ask about signs and symptoms of pulmonary distress, persistent coughing, or difficulty in breathing, which may indicate the presence of *pneumocystis carinii* pneumonia or tuberculosis. Probe for signs and symptoms that may be indicative of neoplasms, notably non-Hodgkin's lymphoma and Kaposi's sarcoma. Because a host of other autoimmune and idiopathic manifestations occur in connection with HIV infection, make a detailed inquiry to elicit information on other unusual signs and symptoms.

Of course, Charles should receive a thorough physical examination and be referred for HIV-testing after he has received pre-test counseling. If he tests positive, he should be counseled further and urged to engage in safe sexual practices to avoid transmitting HIV infection. If he is negative, he should be educated about methods to prevent his acquiring HIV infection.

2. *What oral medical history questions would you ask Charles to determine the extent of his oral health problems?*

Charles should be asked whether he has previously been affected by similar yellow, red, or white patches in other parts of his mouth or whether the corners of his mouth have split and been painful, signs indicative of candidiasis or hairy leukoplakia. Ask if he has noticed painless reddish brown, blue, or purple areas in his mouth (Kaposi's sarcoma). Query him about fever blisters on or around his lips or elsewhere in his mouth, indicative of herpes, or what appear to be cauliflower-like growths (oral warts). He should be asked whether he has noticed his mouth being unusually dry or if he has had difficulty in chewing or swallowing food.

Inquire whether he has found it more difficult or painful to brush his teeth, has noticed spontaneous bleeding from his gums, is aware of a bad odor or bad taste in his mouth, or been aware that his gums have receded around any of his teeth. These symptoms occur with severe gingivitis or necrotizing periodontitis, to which HIV-positive persons are

particularly susceptible, even if good oral hygiene measures are practiced. Of course, Charles should receive a thorough oral examination in conjunction with his physical examination.

3. *What advice would you give Charles concerning dental care, and what instructions would you provide for self-examination of his oral cavity?*

Stress that meticulous oral hygiene to remove dental plaque is vital to minimizing destruction of periodontal tissues and reducing the risks of oral infections. Simple dental problems may become serious in immunosuppressed individuals.

Prompt, routine dental care is extremely important. For example, decayed teeth may harbor candida colonization; therefore, removal of caries and restoration eliminates a possible niche for these fungal organisms in HIV-infected individuals.

Charles should be advised to:

- Examine his face, neck, and mouth weekly
- Inform his dentist or medical care provider of any changes in his face, neck, or mouth
- Inform his dentist of his medical history and HIV status
- Have frequent dental exams, professional tooth cleanings, and prompt dental care
- Brush and floss his teeth often and thoroughly and use other oral cleaning aids to remove dental plaque, which harbors microorganisms and their by-products

Charles should become familiar with the normal look of his face and neck so that he can perceive any changes more easily. He should feel for lumps on his face, neck, or mouth and look for asymmetries. Show him how to palpate the sides of his neck and beneath the lower inner border of his mandible for enlarged lymph nodes.

Charles should examine all oral areas and note anything uncomfortable, unusual, or painful. He should check regularly for puffy or spontaneously bleeding gums. He should look carefully for red, white, or purplish spots in his mouth. He should be aware of bad or unusual tastes or mouth odors, problems in chewing or swallowing, or evidence that teeth have loosened. A good way to train him in oral self-examination is to explain what you are looking for when examining his mouth and throat and ask him to go through the same procedures periodically at home.

Charles should be advised to visit his dentist, take care of dental needs, and have his mouth cleaned professionally while he still has financial resources and ready access to care. You should also stress that Charles should not rely solely on his self-examination to determine whether professional dental consultation is necessary.

Under the Americans with Disabilities Act, dentists are required by federal law to treat patients infected with HIV. Many states have similar laws. With the routine adoption of

barrier techniques and infection control procedures in dental offices, few dentists now refuse to treat HIV patients, and most refusals center on issues of patients' finances or insurance, not on their HIV infection status.

4. *What treatment can you suggest to treat Charles' candidiasis or other oral problems that may develop?*

Oral lesions seen most frequently in HIV-infected patients may be classified into five categories based largely on etiology:

- Fungal
- Bacterial
- Viral
- Neoplastic
- Unknown

The most common oral fungal infection is candidiasis. Various topical and systemic medications are available to treat fungal infections. The type, dosage, and duration of therapy depends on the severity of the lesions and the patient's medical status. Recurrence is high in immunocompromised patients, so they must be monitored closely. Topical agents are applied several times a day and may contain high concentrations of sucrose. Patients on these medications should use fluoride-containing products, such as fluoride toothpastes and mouth rinses without alcohol. They should be advised against consuming alcohol frequently or using alcohol-containing mouthwashes because alcohol is a soft tissue dehydrant and can promote fungal infection. Refractory cases of candidiasis may occur after prolonged use of antifungal agents, complicating selection of added medications.

HIV-associated gingivitis, periodontitis, and necrotizing stomatitis are caused by bacteria. These progressive infections do not respond readily to conventional therapy. The lesions cause severe pain. Aggressive debridement with adjunctive antimicrobial agents such as metronidazole is required. Patients must maintain meticulous oral hygiene to remove dental plaque. Frequent professional tooth scaling and root planing are necessary. Chlorhexidine gluconate (Peridex or Periogard) is suggested as an antimicrobial rinse twice daily. However, severely affected patients do not readily tolerate astringent chlorhexidine gluconate rinses. Gram-negative antibiotics may be indicated for patients who are febrile, manifest lymphadenopathy, or have severe necrosis of soft or bony tissue. Metronidazole, clindamycin, Augmentin and tetracycline have been used effectively. Extended use of antibiotics, however, increases the risk of opportunistic fungal infections.

Viral infections, which include various herpetic lesions, are painful and may lead to ulceration and scarring. Topical or systemic antiviral agents such as Zovirax (acyclovir) have been used successfully, but resistant viral strains have evolved. Oral warts are caused

by human papilloma viruses. They are treated by various surgical removal techniques but tend to recur.

Hairy leukoplakia is caused by Epstein-Barr virus. Usually, it is asymptomatic but may interfere with mastication and be superimposed by candidiasis. Antiviral agents may reduce its signs and symptoms, and podophyllin has been used to reduce its unsightliness.

Kaposi's sarcoma is the principal neoplastic oral lesion associated with HIV-infected persons. Treatment consists of surgical excision, cryosurgery, radiation therapy, sclerotherapy, and injections with various chemotherapeutic agents. Lesions tend to recur. Infusion of chemotherapeutic agents is sometimes indicated. If chemotherapy or radiation is needed, complete oral rehabilitation and tooth and root scaling are indicated prior to treatment because healing of bone is compromised after chemotherapy or radiotherapy.

The cause of recurrent aphthous ulcers is unknown. They seem to respond well, however, to topical corticosteroids. Lesions that do not respond to corticosteroids should be biopsied to determine their etiology. Cytomegalovirus has been identified in some ulcerative lesions; these may respond to antiviral therapy.

The cause of HIV-associated salivary gland disease also is unknown. Clinical symptoms may be alleviated by administration of AZT and anti-inflammatory agents. Salivary flow may be increased by sugarless gums, mints, or candies, or with sialogogues, such as pilocarpine or bethanechol. Artificial saliva products also alleviate dry mouth. Frequent sips of water are recommended.

HIV-positive patients with signs of infection in the mouth should receive frequent dental check-ups, at least once every three months. Those without signs or symptoms of oral infection should receive dental check-ups every six months. If Charles is or becomes HIV-positive, it is important for him to maintain a nutritious diet to maintain energy levels, optimize his immune system to fight infection and promote healing of damaged tissues. If his mouth is sore, Charles should be advised to avoid hot, spicy, or salty foods. Before eating, he might find it helpful to try numbing painful areas with ice chips and to drink liquids through a straw. Blended foods that are cool, smooth, and creamy may be tolerated most easily.

## SECTION 6 SUGGESTED ACTIVITIES

1. Ask each participant to examine his or her own oral and pharyngeal tissues as if doing a self-examination for oral manifestations of HIV/AIDS. Provide small flashlights, free-standing mirrors, gauze squares and tongue depressors, if possible, to enhance the quality and thoroughness of the examinations.

The facilitator may wish to use the handout/overhead "Recommended Methods for Self-Examination of the Oral Cavity" to ensure that all oral and pharyngeal tissues are inspected. Stress that the oral and pharyngeal tissues be examined thoroughly, following a sequence that should become routine so that all areas are inspected.

2. Ask the group to form pairs. Ask one member of each pair to examine the oral and pharyngeal tissues of the other for manifestations of HIV/AIDS infection. A portable light source and the same supplies designated for self-examination should be used. After completion, ask the pair members to reverse roles. Again, the primary objective is to do a thorough examination in a logical sequence.

## SECTION 7 SUGGESTED READING

1. Epstein JB, Silverman, Jr. S. Head and neck malignancies associated with HIV infection. *Oral Surg Oral Med Oral Pathol.* 1992;73:1993–2000.  
Describes the prevalence, clinical features, and management of malignancies that affect HIV-infected individuals. Includes black and white photos.
2. Glick M. *Dental Management of Patients with HIV.* Chicago, IL: Quintessence Publishing Company; 1994.  
Explores the oral manifestations of HIV infections and considers aspects of infection control and dental care for patients with AIDS.
3. Greenspan JS, Greenspan D (eds). *Proceedings of the Second International Workshop.* Chicago, IL: Quintessence Publishing Company; 1995.  
Contains the most current information on oral manifestations, diagnosis, and management of HIV-associated infections and lesions. Papers explore the impact of HIV/AIDS on professional, medical, and dental education and practice.
4. Little JW, Falace DA. *Dental Management of the Medically Compromised Patient,* Fourth Edition. St. Louis, MO: Mosby; 1993.  
Chapter 14, "AIDS and Related Conditions," (pages 289–315) reviews data on the incidence and prevalence of AIDS and its pathophysiology. Medical and dental considerations for the management of those infected by HIV are discussed in detail. Contains excellent photographs, tables, and graphs.
5. Navazesh M, Lucatorto F. Common oral lesions associated with HIV infection. *J Cal Dent Assoc.* 1993;21(9):37–42.  
Discusses the signs, symptoms, and management of the most common HIV-associated oral lesions, illustrated by 11 color photographs.
6. Silverman, Jr. S. Common oral manifestations. In: *Clinician's Guide to Treatment of HIV-Infected Patients.* Glick M (ed). The American Academy of Oral Medicine; 1993:14–20.  
Summarizes the clinical appearance, significance, and treatment options for the fungal, viral, bacterial, neoplastic, and miscellaneous lesions that commonly affect the oral cavities of HIV-infected patients.

## SECTION 8 RESOURCES

1. **Atlas of the Mouth in Health and Disease.** This illustrated textbook contains pictorial references of normal oral and facial anatomy, which may help health care providers to judge deviations.

Contact: The American Dental Association, 211 East Chicago Avenue, Chicago, IL 60611. 800-947-4746. \$24.95 plus \$3.95 handling for American Dental Association members (prices are 40 percent higher for non-members).

2. **Detecting Oral Cancer: A Guide for Dentists.** Although the color photographs in this brochure/poster are designed to help detect oral cancer, they provide excellent depictions of normal oral/pharyngeal tissues.

Developer: National Institute of Dental Research, National Institutes of Health, Public Health Service, Department of Health and Human Services.

Contact: National Institute of Dental Research, Building 31, Room 2C-35, 31 Center Drive MSC 2290, Bethesda, MD 20892. Free.

3. **HIV Infection and Oral Health.** This patient brochure with excellent photographs describes and depicts the common oral problems found in persons with HIV or AIDS. It advises these patients on what actions to take to reduce the incidence of oral health problems and clearly describes how they should examine their oral cavities to detect signs of abnormalities.

Authors/Developers: Myron Allukian, Jr., D.D.S., M.P.H., Helene Bednarsh, R.D.H., M.P.H., and Lee Thornhill.

Contact: Bureau of Oral Health Programs, Boston Department of Health and Hospitals Boston, MA 02118. 617-534-4717. Free

4. **Pictures and Criteria for Identification of Oral Manifestations in HIV-Infected Patients.** This publication provides color photographs of the principal conditions that affect the oral cavities of immunosuppressed individuals, along with diagnostic criteria for their identification.

Author/Developer: Jens J. Pindborg, D.D.S., Dr. Odont, Royal Dental College, Copenhagen, Denmark.

Contact: WHO Collaborative Centre for Oral Manifestations of HIV, under WHO Global Program on AIDS and EEC's Clearinghouse for Oral Problems Related to HIV Infection. Dental Department, University Hospital and Royal Dental College, 20 Nr. Alle, DK2200 Copenhagen, Denmark, or WHO/ORH, 20 Avenue Appia, 1211 Geneva 27, Switzerland.



5. **A Vital Opportunity: Dentistry's Role in the Prevention of HIV Transmission through Health History Review.** (1992). Targeted mainly to dental professionals, this one-hour educational module helps providers identify risk factors for HIV and make sensitive referrals for counseling and testing. Includes a lecture and discussion materials, a 12-minute video, activities, and handouts.

Author/Developer: Jared I. Fine, D.D.S., M.P.H., and Sandi Goldstein, M.P.H.

Contact: East Bay AIDS Education & Training Center. (Kathleen Clannon, M.D., Director) 1411 East 31st Street, Oakland, CA 94610. 510-437-5172. \$65.

## **SECTION 9 HANDOUTS/OVERHEADS**

## **Recommended Methods For Self-Examination of the Oral Cavity**

For thorough oral self-examinations, the patient should obtain a small flashlight to illuminate the interior of the mouth and throat. A metal tongue depressor or a supply of wooden ones and two-inch gauze squares should be used. The patient should examine the mouth and throat as follows:

### **Floor of the mouth**

Touch the tip of the tongue to the back of the roof of the palate to permit maximal visualization of the underside of the tongue and floor of the mouth. Use a forefinger to palpate these tissues.

### **Roof of the mouth (palate)**

Say "Ah" and tilt the head slightly backward for best viewing. A tongue -depressor will keep the tongue from blocking a direct view. Use a forefinger to probe suspicious areas.

### **Tongue**

Stick out the tongue and grasp the end with a gauze square. Inspect the top of the tongue and palpate suspicious areas. Pull the tongue to the right and inspect and touch the left side and then to the left to examine the right side.

### **Cheeks**

Pull one cheek away from the teeth with the fingers. With the mouth slightly closed for visibility, inspect and palpate cheek tissues. Repeat on the other cheek.

### **Lips and Gums**

Inspect the lips by first looking at and feeling the outside. Pull the lower lip down with single forefingers or between the thumb and forefinger and look closely at the inner lip and the gums around all the lower teeth. Open the mouth wide to see the tongue side of the gums. Repeat the same procedure for the upper lip and gums.

## Clinical Appearance and Significance of Common Oral Manifestations of HIV Infection

CLINICAL APPEARANCE	SIGNIFICANCE
<b><u>FUNGAL INFECTIONS</u></b>	
<b>Pseudomembranous Candidiasis (thrush)</b> White or yellowish plaques that can be wiped off. Found on any oral surface.	Associated with initial and progressive immune suppression. CD4 cell counts usually below 400 cells/mm <sup>3</sup> .
<b>Erythematous or Atrophic Candidiasis</b> Red or atrophic areas commonly found on the hard or soft palates, buccal mucosa and tongue.	Detectable in the early stages of HIV disease.
<b>Hyperplastic Candidiasis</b> White or discolored singular or confluent plaques that cannot be wiped off. Patients complain of burning sensation. Found on any oral surface.	Associated with severe immunosuppression and long-standing HIV disease.
<b>Angular Cheilitis</b> Radiating fissures from the corners of the mouth, sometimes covered with a white membranous material that can be wiped off.	Occurs during early and progressive HIV disease, sometimes in conjunction with xerostomia.
<b><u>VIRAL INFECTIONS</u></b>	
<b>Human Papilloma Virus (oral warts)</b> White or pink nodules with a cauliflower-like surface. Commonly found on the gingiva and tongue.	Presence may be a marker for HIV infection.
<b>Recurrent Herpes Simplex Virus Infection</b> Round or oval, shallow, small, painful ulcerations. Found on mucosal surfaces. May coalesce, be hemorrhagic, and be covered by yellowish pseudomembrane.	Frequent recurrences. Confluent lesions occur during advanced stages of AIDS.
<b>Oral Hairy Leukoplakia (Epstein-Barr virus)</b> Asymptomatic, white, vertically corrugated, hyperkeratotic lesions, usually on lateral border of the tongue.	May be an early marker for HIV infection.
<b>Cytomegalovirus Infection</b> Nonspecific, nonhealing, large, painful ulcerations on any mucosal surfaces. Requires histologic diagnosis for confirmation.	Occurs with severe immunosuppression when CD4 counts drop below 100 cells/mm <sup>3</sup> .

CLINICAL APPEARANCE	SIGNIFICANCE
<u><b>BACTERIAL INFECTIONS</b></u>  <b>Necrotizing Ulcerative Gingivitis or Periodontitis</b> Rapid, localized destruction of alveolar bone and periodontal tissues associated with severe pain and spontaneous gingival bleeding.	Associated with severe immunosuppression when CD4 counts are below 100 cells/mm <sup>3</sup> .
<b>Linear Gingival Erythema (gingivitis)</b> Localized, mostly anterior erythematous area of marginal gingiva with petechial patches on attached gingiva associated with spontaneous gingival bleeding.	May be a precursor of necrotizing ulcerative periodontitis. Responds poorly to conventional therapy.
<u><b>NEOPLASMS</b></u>  <b>Kaposi's Sarcoma</b> Red, bluish, or purplish macular or nodular lesions most often found on hard or soft palates. May be associated with ulcerations.	Represents an AIDS diagnosis. Oral lesions may be first sign. Associated with CD4 counts of below 200 cells/mm <sup>3</sup> .
<u><b>MISCELLANEOUS LESIONS</b></u>  <b>Salivary Gland Disease</b> Parotid gland enlargement from white blood cell infiltrate, accompanied by xerostomia.	May occur at all stages of HIV infection or as a side effect of medications.
<b>Necrotizing Stomatitis</b> Rapid, localized destruction of alveolar bone, accompanied by necrosis of overlying tissues. Not always painful.	Occurs with severe immunosuppression with CD4 cell counts below 100 cells/mm <sup>3</sup> .
<b>Aphthous Ulcerations</b> Large (>10 mm), painful, nonhealing, deep-seated ulcerations without a known etiologic pathogen.	Associated with severe immunosuppression with CD4 cell counts below 200 cells/mm <sup>3</sup> .

Adapted from Silverman Jr., S. Common Oral Manifestations. In: *Clinician's Guide to Treatment of HIV-Infected Patients*. Glick M (ed.). The American Academy of Oral Medicine; 1993.

## Some Treatments for Oral Manifestations of HIV Infection

Condition	Regimen
Candidiasis	Topical antifungal agents, e.g., nystatin, clotrimazole, miconazole nitrate Systemic antifungal agents, e.g., ketoconazole, fluconazole
Hairy leukoplakia (EBV)	Usually no treatment; acyclovir, 2.4 to 3g orally per day for 2 weeks
Herpes Simplex	Usually no treatment; acyclovir, 1 to 1.4g orally per day for 7 to 10 days
Herpes zoster	Treat promptly to prevent scarring; acyclovir, 800mg orally, 5 times per day for 7 to 10 days
Recurrent aphthous ulceration	A small isolated lesion may not need treatment; other lesions can be treated by: <ul style="list-style-type: none"> <li>• Topical fluocinonide ointment, 0.05%, mixed with Orabase, apply 6 times per day</li> <li>• Dexamethasone elizir, 0.5mg per 5ml; rinse and expectorate 2 to 3 times per day</li> </ul> A large atypical ulcer may require biopsy to rule out lymphoma or rare fungal infections
Xerostomia	Sugarless gum, artificial saliva, topical fluorides, improved oral hygiene, frequent sips of water
Oral warts	CO <sub>2</sub> laser, surgical excision, cryosurgery, electrosurgery
Periodontal disease 1. HIV gingivitis  2. HIV periodontitis  3. HIV necrotizing gingivitis	Debridement, povidone-iodine, irrigation (Betadine 10%); Peridex or Periogard (0.12% chlorhexidine gluconate mouth rinse, 2 times per day) Above, plus scaling and planing of root surfaces of teeth; for [QUERY: Author left a blank here.] or [QUERY: Author left a blank here.]; bone involvement: metronidazole, 250mg, 4 times per day, for 4 or 5 days Home irrigation with povidone-iodine; use of interproximal brushes
Kaposi's sarcoma	Surgical debulking, intra-lesional sclerotherapy or vinblastine, CO <sub>2</sub> , laser, radiation
Oral lymphoma	Debridement, scaling, prophylaxis before treatment, radiation, chemotherapy

Adapted from Little JW, Falace DA. *Dental Management of the Medically Compromised Patient*, Fourth Edition. St. Louis, MO: Mosby; 1993, Chapter 14, Table 14–15.

## **SUBTOPIC 2**

### **ORAL CANCER**

#### **TIMELINE (50 minutes)**

5 min	Introduction/Ice Breaker
5 min	Review of Objectives/Format
15 min	Overview
20 min	Review of Case/Questions
5 min	Additional Questions and Answers

#### **SECTION 1 LEARNING OBJECTIVES**

Target Group: Nurse practitioners, physician assistants, medical and nursing students, practicing clinicians, and health services personnel in training.

By the end of this discussion, participants should:

1. Know the major risk factors and principal sites for oral cancer development
2. Provide a thorough oral examination for abnormalities that may be malignant or may need professional attention
3. Know what screening tests may be used as adjuncts to biopsy of suspicious lesions
4. Be able to advise patients on reducing behaviors or factors that raise their risk of oral cancers
5. Understand the importance of providing necessary dental rehabilitative work before a patient undergoes radiation or chemotherapy for oral cancers
6. Know when to refer patients for biopsies of suspicious lesions in their oropharynx
7. Teach patients how to do a self-examination for oral and pharyngeal abnormalities and why they should do so

## SECTION 2 ICE BREAKER

This exercise is designed to sensitize participants to the prevalence, morbidity, and mortality of cancers of the oral cavity and pharynx, compared with other cancers. The facilitator asks participants to rank the estimated number of new cases of various types of cancers in the United States in 1999. Mention several cancer types, some with a higher incidence and some with a lower incidence than oral cavity/pharynx, from the following list.

### **Estimated Number of New Cases, United States, 1999**

<u>Type of Cancer</u>	<u>New Cases (in thousands)</u>
Breast	196
Prostate	179
Lung	172
Colon/rectum	129
Bladder	54
Uterine	50
Melanoma	44
Oral cavity/pharynx	30
Leukemia	30
Kidney	30
Pancreas	29
Ovary	25
Stomach	22
Brain/central nervous system	17

Key points to be made include:

- Thirty thousand new cases of cancer of the oral cavity and pharynx are diagnosed each year.
- Their annual incidence is greater than that for cancers of the pancreas, stomach, ovary, and brain/central nervous system.
- Eight thousand persons per year die from cancers of the oral cavity and pharynx.
- The overall five-year percentage survival for oral cavity and pharyngeal cancers is lower than for cancers of the colon, cervix, prostate gland, bladder, and for melanoma of the skin.

## SECTION 3 OVERVIEW

Each year, more than 30,000 people in the United States are diagnosed with oral cancers and more than 8,000 die as a result. Oral cancers represent 3.1 percent of all cancers diagnosed annually; they are more common than leukemia, melanoma, and cancers of the brain, liver, kidney, thyroid, stomach, ovary, or cervix. Yet the public and the health professions generally lack sufficient knowledge about the causes of these cancers and ways in which they may be prevented.

Oral cancers occur in all sites of the oral cavity and the pharynx. The most common type is squamous cell carcinoma. Carcinomas account for 96 percent of all oral cancers and sarcomas make up the remainder. The posterior lateral borders of the tongue and the floor of the mouth are the most common sites; other frequent sites are the oropharynx and the lips. Eighty-five percent of all oral cancers occur on these four sites.

In the United States, more than 90 percent of all oral cavity and pharyngeal cancers occur in people older than 45 years of age, and half occur in those 65 years or older. Males are about twice as likely as females to develop oral cancer, although the incidence in women is rising. The annual incidence rate is about 30 percent higher among African Americans than among whites, and the mortality rate is twice that of whites.

The major risk factors for oral cancers are use of tobacco and use of alcohol. Other risk factors include unprotected exposure to the sun (for cancer of the lips) and dietary factors. The combined use of tobacco and alcohol increases the risk greatly. Persons who smoke two packs of cigarettes and consume four alcoholic drinks per day have a 35-fold increased risk compared with those who abstain from both behaviors.

Everyone should receive an oral cancer exam annually. If oral cancer is detected early, the prognosis for five-year survival after treatment is better than for most other cancers and for oral cancers detected in late stages. The five-year survival rate for oral cancers is 75 percent for those diagnosed and treated when the lesions are localized, but survival drops to 16 percent for oral cancers that have metastasized. Unfortunately, most oral cancers are not diagnosed until they are advanced, even though most areas of the oral cavity are readily accessible, and many oral cancers have identifiable clinical features, an effective screening method. Treatments for early lesions produce little or no deformity.

Mortality from oral cancer is higher in population groups that have poor access to or utilization of professional health personnel, such as those who are economically disadvantaged, elderly, or are people of color. Persons in these groups are less likely to have an early cancerous lesion detected than those who have regular access to health care. Because people are more likely to visit medical than dental offices, it is important that medical personnel know the risk factors for oral cancers and know how to detect these cancers. A recent survey showed that 84 percent of physicians believed it is important to provide oral cancer exams to all patients 65 or older. But only 22 percent believed their oral cancer knowledge was current, and 55 percent did not feel adequately trained to do such exams.



An examination for oral cancer does not require sophisticated equipment and takes only a few minutes. It requires only adequate lighting, 2 x 2 gauze squares, gloves, and either two dental mouth mirrors or two tongue depressors to retract the sides of the mouth for visibility. Any partial or complete dentures should be removed before the examination.

Health care providers should adopt a systematic sequence for an oral cancer exam. The face and lips should be examined first to check for crusts, growths, color changes, and asymmetries. All cervical lymph nodes should be palpated bilaterally for enlargements. The lips, including the commissures, should be inspected while closed and while parted.

Intraoral tissues and structures should be examined for changes in color, texture, mobility, or other abnormalities. All visibly accessible soft tissues, including "nooks and crannies," should be viewed in a systematic order. One suggested sequence is:

- Labial mucosa and sulcus
- Buccal mucosa and commissure
- Gingiva and gingival ridges
- Tongue
- Floor of the mouth
- Hard palate
- Soft palate and oropharyngeal tissues

The tongue should be checked at rest and when protruded to each side to check for swellings, ulcerations, and changes in color or texture. Use a gauze square to assist full protrusion for inspection of the tongue's lateral borders. The ventral surfaces of the tongue and floor of the mouth should be inspected and palpated as the patient elevates the tongue to the palate. To inspect the palatal and oropharyngeal areas, the patient's head should be tilted back and the tongue depressed by the examiner. All seemingly abnormal areas should be palpated.

Patients can easily examine parts of their oral cavities themselves for oral cancer, although a self-examination is more difficult in the back of the mouth and for most of the pharynx (see Subtopic 1 of this module).

A red and/or white patch that does not disappear after about two weeks should be suspect. Pain and swelling are not often associated with early lesions. Early carcinomas in and around the oral cavity often are asymptomatic, which partly explains why most are not diagnosed until they are advanced. Flat, white (leukoplakia), or red lesions (erythroplakia) on mucosal tissues should be considered premalignant, although many leukoplakias do not become malignant. Leukoplakias are areas of hyperkeratosis that cannot be removed by scraping. Although many leukoplakias are associated with smoking and other sources of irritation, causes of many are unknown. Leukoplakias are more common than erythroplasias, but the latter are more likely to transform into malignancies. Particularly dangerous are leukoplakias that have a red component (erythroleukoplakias), which are far more likely to undergo malignant changes.

If an abnormal area has been found on the lips or in the oral cavity, a biopsy of the tissue is the only definitive way to know whether it is malignant. Immediate biopsy of all ill-defined, suspicious areas, however, is not always practical or recommended. Exfoliative cytology is one technique that may be used as a preliminary, noninvasive adjunct to biopsy. The procedure entails obtaining surface cells from an affected area with a cotton-tipped applicator or wooden spatula, smearing the cells onto a glass plate, staining them, and examining them microscopically for evidence of malignancy.

Another noninvasive method to aid in the early recognition of possible malignancies is the application of toluidine blue dye to the lesion. Toluidine blue dye stains only dysplastic or malignant tissue and is used to identify the borders of a lesion at the time of biopsy. The advantages of oral cytology and the use of toluidine blue dye is that they are not invasive. The use of exfoliative cytology or toluidine blue dye has been shown to accelerate the use of biopsies for lesions that appear to be benign or innocuous but actually are malignant.

Lesions should not be treated or removed without confirming malignancy by histologic examination of tissues taken from the lesions. For smaller lesions, punch or excisional biopsies may be done. Larger lesions may warrant incisional, scraping, or aspiration biopsies (in the case of major salivary glands), in which a tissue sample is removed for evaluation.

Oral cancers may be treated with surgery alone, radiation therapy alone, or a combination. Small tumors often can be treated by surgery or radiation alone, whereas advanced tumors often require combinations of both. Chemotherapeutic drugs also are used for some oral advanced cancers in combination with radiation and surgery.

Squamous cell carcinomas of the oral cavity spread primarily by local extension or through the lymphatic system. Muscle and bone adjacent to untreated malignancies become involved by direct extension. Lymphatic spread occurs initially to the cervical lymph nodes of the head and neck. Enlarged nodes can be palpated and, frequently, the detection of such nodes is the first sign that a carcinoma exists somewhere in the oral cavity. Spread to bone, liver, and lung through the bloodstream is not common. These secondary-site cancers retain the cellular characteristics of the original site and are considered metastatic oral cancers rather than primary-site cancers of the affected organs.

Treatment for oral cancer often causes temporary or permanent cosmetic and/or functional side effects. Surgical removal of large tumors may result in the need for removal of parts of the maxilla, mandible, tongue, or soft tissues. In addition to serious cosmetic changes, surgery may cause problems with chewing, eating, drinking, swallowing, and speaking. If treatment includes removal of lymphatic tissue, lymph may accumulate and cause prolonged swelling. Mucositis from adjunctive chemotherapy may be produced. If radiation is required, all necessary tooth extractions and dental restorations should be done at least two weeks before radiation begins to allow time for healing. Radiation produces acute skin reactions, mucositis, and possible soft tissue necrosis. Bone in the field of radiation may develop osteonecrosis, and simple extractions after radiation may not heal.

Radiated salivary glands do not produce normal quantities of saliva, which often leads to increased caries and oral discomfort from xerostomia. It is vital to provide continuing intensive fluoride therapy (fluoride gels and mouth rinses) before and after radiation to prevent rampant dental decay. Artificial saliva products, frequent sips of water, and salivary gland stimulants may relieve the discomfort caused by dryness of the mouth. Loss of taste is a common complaint following radiation, which may lead to loss of appetite. Infections of the mouth by *Candida albicans* are commonly seen in irradiated patients.

Rehabilitation and counseling are essential parts of treatment for many oral cancer patients, who frequently are devastated. Various members of a health care team, such as social workers, psychiatrists, and speech therapists, may help patients resume a normal life. Surgery can help restore function and appearance; frequently, a prosthesis is necessary to restore extensive defects. Dental surveillance, preventive treatments, and the maintenance of good oral hygiene are essential.

## SECTION 4 CASE STUDY/DISCUSSION QUESTIONS

Mr. Petersen, a 61-year-old man, visits your medical clinic. His chief complaint is a crusty sore on his lower lip that has not healed in six weeks. A medical history indicates that Mr. Petersen emigrated from Scandinavia with his parents when he was in his teens. He always has worked on a farm and, for the past 20 years, has worked his own farm. He has smoked more than two packs of cigarettes a day and has consumed large quantities of alcohol regularly for many years. Four years ago, he began to use snuff in an effort to cut down on smoking. An oral examination reveals asymptomatic areas of leukoplakia on the right lateral border of his tongue and on the adjacent mucosa of his cheek.

1. What would you do to determine whether Mr. Petersen's lesions are cancerous?
2. What advice would you offer Mr. Petersen to reduce the risk of his lesions becoming malignant or, if malignancy already is present, to reduce the risk of recurrence after treatment?
3. If Mr. Petersen requires radiation, what dental treatment should be done before treatment, and what palliative and preventive dental procedures should be done after treatment?

Remember, cultural issues may play a significant role. For example, an older person who feels he or she has "lived a good life" or who "enjoys a drink at the end of a hard day's work" may choose to refuse certain kinds of treatment or refuse to consider lifestyle changes that may prolong life. In some situations, such a response might be unthinkable. In others, some might accept it as a reasonable response.

## SECTION 5 SUGGESTED ANSWERS

1. *What would you do to determine whether Mr. Petersen's lesions are cancerous?*

Thoroughly examine Mr. Petersen's face, neck, and oral cavity. Look for facial asymmetries and palpate sites of all accessible cervical lymph nodes. Between 150 and 350 lymph nodes are located in the head and neck above the clavicles—nearly one-third of the total number of lymph nodes in the body.

Usually, lymphatic metastasis begins high in the neck and progresses to the lower neck, just above the clavicle. Lymph nodes containing malignant cells gradually grow, are not tender, and have a firm texture. They may be freely movable, but, if the tumor breaks through the lymph node capsule, they become affixed to vital structures such as the carotid artery. Lymph nodes also may become enlarged if there is infection of the primary lesion or from other infections. Usually, such nodes are softer and more tender to palpation than malignant nodes. A fine needle aspiration biopsy may be performed on suspicious nodes.

A definitive diagnosis of the malignancy of Mr. Petersen's lesion can be made only by biopsy. The likely etiologic factors responsible for the lesion should be eliminated, whether it is malignant or not. If the biopsy is positive, then excisional surgical removal, radiation therapy, or a combination should be initiated.

The choice between surgery or radiation is often dictated by assessing the likely functional and cosmetic results. Other considerations are the degree of invasiveness of the malignancy and whether lymph nodes are involved. Approximately 90 percent of lip cancers are localized when diagnosed. The five-year survival rate for treated localized lip cancers is about 95 percent. Even when lip cancers have spread, the five-year survival rate is 78 percent.

Before doing a biopsy on the areas of leukoplakia inside Mr. Petersen's mouth, it may be desirable to obtain cells from the lesions by exfoliative cytology or to ascertain whether dysplastic or malignant cells are present with use of a toluidine blue stain in a mouth rinse. If either test is positive, the lesion should be removed. If both are negative, removal of the putative irritating factors, which may be contributing to the leukoplakia, should be attempted.

Most leukoplakias are benign, but some (about 5 percent after 20 years) progress to precancerous lesions or oral cancers. Although the causes of leukoplakia are not fully understood, they commonly are associated with chronic irritation, such as excessive tobacco and alcohol use, cheek biting, or ill-fitting prostheses. Some leukoplakias occur in the absence of any obvious irritating factors. If leukoplakia persists after removal of irritating factors, a biopsy is warranted.

2. *What advice would you offer Mr. Petersen to reduce the risk of his lesions becoming malignant or, if malignancy already is present, to reduce the risk of recurrence after treatment?*

First and foremost, Mr. Petersen should be encouraged to stop smoking, using snuff, and consuming alcohol. The National Cancer Institute states that cigarette use accounts for 80 percent of all oral cancer deaths in the United States annually. Stopping smoking reduces oral cancer risks to those of nonsmokers after 10 years, possibly sooner. Smokeless tobacco use is growing rapidly in the United States. Epidemiologic evidence clearly links the use of smokeless tobacco, particularly snuff, with oral cancer. The risk of oral cancer among users in one study was four times as great as among nonusers.

Because Mr. Petersen spends a lot of time outdoors, he should be advised to put on a wide-brimmed hat, a sunscreen with an SPF of at least 15 on exposed body parts, and a lip balm with SPF 15 when outdoors. The association between prolonged sun exposure and cancer of the lower lip has long been noted.

Leukoplakia often recurs after treatment. Although definite proof is lacking, some nutritional supplements, such as vitamin A, beta carotene, and vitamin C, are being tested for their ability to prevent or reverse leukoplakia. Cancers of the mouth have been related in epidemiologic surveys to low intake of fruits and vegetables. Although the National Cancer Institute does not recommend that people take dietary supplements to prevent cancer, it would be good advice to recommend that Mr. Petersen consume a diet rich in fruits and vegetables.

Mr. Petersen should be examined for and questioned about other habits and conditions that produce chronic injury to soft tissues, such as cheek chewing, lip biting, pipe smoking, sharp or malaligned teeth, or ill-fitting dentures. Identifying and removing these sources of irritation, although not considered proven methods of cancer prevention, may lead to complete regression of leukoplakia.

3. *If Mr. Petersen requires radiation, what dental treatment should be done before treatment, and what palliative and preventive dental procedures should be done after treatment?*

Doses of ionizing radiation that kill cancer cells induce unavoidable changes in surrounding tissues that interfere with function and their ability to heal. Mr. Petersen should receive a thorough dental evaluation before radiation begins. All healthy teeth without serious periodontal tissue infection should be preserved. All carious teeth with good periodontal tissue integrity should be restored. Teeth with advanced caries, periapical lesions that would ordinarily require root canal therapy, or with severe periodontal disease may need to be extracted. Such extractions should be done at least two weeks before radiation is started to permit healing.

Because tissue changes induced by radiation persist for long periods and sometimes are irreversible, extreme care must be taken to evaluate Mr. Petersen's dentition and periodontal tissues before treatment is initiated. Deep scaling of periodontal pockets should also be done at least two weeks prior to treatment. Providing all necessary dental care is critical, because many infections may occur months or years after radiation and tissues may not heal satisfactorily.

Because tissues are frequently tender following radiation, patients sometimes neglect routine home care. When dental plaque accumulates, the risk of developing caries and periodontal diseases increases. Mr. Petersen must be convinced to practice preventive home care. He should use soft children's toothbrushes or other devices with soft, spongy tips that he may find acceptable. He should use a fluoride toothpaste with the acceptance seal of the American Dental Association for toothbrushing at least twice a day. He should use a fluoride mouthwash at least once a day, preferably after each meal. Because commercial products are astringent and contain alcohol, a prescription of a 0.2 percent neutral sodium fluoride mouth rinse may be more acceptable. High-potency, fluoride-containing gels are available by prescription. Regular use of rinses and gels has been shown to be effective in preventing rampant dental caries that often occurs in irradiated patients whose saliva production has been compromised.

Mr. Petersen should be referred to a dentist or dental hygienist who will show him how to remove dental plaque thoroughly from his teeth and provide professional fluoride and prophylaxis treatments. Health care providers should reinforce health care messages that Mr. Petersen is likely to receive during dental visits. Mr. Petersen requires continuing oral health education, instruction, and reinforcement to ensure that he is doing as good a job as possible in preventing oral disease development. To reduce the risk of caries, Mr. Petersen should be urged to decrease the frequency of consuming refined sugars.

If Mr. Petersen wears dentures, he may find that they do not fit properly following radiation. Gum tissue tends to shrink during and after radiation. He may find it necessary to have his dentures relined or replaced after a few months.

## **SECTION 6 SUGGESTED ACTIVITIES**

1. Ask each participant to get familiar with his or her own mouth by doing a self-examination of facial, oral, and pharyngeal tissues. If possible, provide small flashlights, free-standing mirrors, gauze squares, and tongue depressors to enhance the quality of the inspection. If a participant notices anything unusual, ask others to inspect the area and discuss.
2. Separate the class into pairs. Ask one member of each pair to examine for abnormalities of the face, lips, mouth, and throat of the other member. Examination gloves should be worn. If possible, provide gauze squares, tongue depressors, and a portable light source. After completion, reverse roles. Share unusual findings with other participants.



## SECTION 7 SUGGESTED READING

1. Horowitz A, Nourjah P, Gift HC. U.S. adult knowledge of risk factors and signs of oral cancers: 1990. *J Am Dent Assoc.* 1995;126:39–45.  
Provides information from the 1990 National Health Interview Survey by the National Center for Health Statistics. Only 25 percent of U.S. adults were able to identify one sign (of six) of oral cancer, and tobacco use was the only risk factor (of five) that a majority identified correctly. The authors conclude there is a general lack of knowledge about oral cancers.
2. National Cancer Institute, National Institutes of Health, Public Health Service, Department of Health and Human Services. *Oral Cancers: Research Report.* (NIH Publication No. 92-2876). Bethesda, MD; 1991.  
This 37-page report summarizes information on the incidence, mortality, causes and risk factors, prevention, detection, diagnosis, and treatment of cancers of the mouth and upper throat. It contains a glossary of terms related to these cancers and a list of free materials available from the National Cancer Institute.
3. National Cancer Institute, National Institutes of Health, Public Health Service, Department of Health and Human Services. *What You Need to Know About Oral Cancer.* (NIH Publication No. 93-1574). Bethesda, MD; 1993.  
A 28-page version of item 2 above, directed to patients. It contains a glossary and questions patients may have concerning biopsies, treatment choices, and effects of surgery and radiation.
4. National Institute of Dental Research, National Institutes of Health, Public Health Service, Department of Health and Human Services. *Dry Mouth (Xerostomia).* (NIH Publication No. 91-3174). Bethesda MD, 1991.  
This brochure explains what dry mouth is and its causes, why saliva is important, and what may be done to get relief from the condition.
5. Silverman, Jr. S. *Oral Cancer* (Third Edition). Atlanta, GA: American Cancer Society; 1990.  
This comprehensive, 148-page monograph presents detailed information on the epidemiology, etiology, prevention, diagnosis, treatment, rehabilitation, and survival of patients with oral and pharyngeal cancers. It contains many helpful photographs, tables, and graphs.
6. Yellowitz JA, Goodman HS. Assessing physicians' and dentists' oral cancer knowledge, opinions and practices. *J Am Dent Assoc.* 1995;126:53–60.  
Completed questionnaires from 93 physicians and 57 dentists indicated that they had similar knowledge about the critical size of suspicious lesions that distinguishes early from well-developed lesions. Nearly three-quarters of the dentists, but only about one-third of the physicians, believed that their knowledge

of oral cancer was current. About 83 percent of dentists, but only 18 percent of physicians, stated that they routinely do an annual oral cancer examination for at least 50 percent of their patients. The authors conclude that a need exists for interprofessional and interdisciplinary health care delivery approaches to reduce oral cancer mortality.

## SECTION 8 RESOURCES

1. **Detecting Oral Cancer: A Guide for Dentists.** This brochure, which opens into a large poster, contains 15 excellent color photographs that depict examination methods for detecting oral and upper pharyngeal cancer, along with helpful hints on palpation and inspection procedures. On the reverse side is information on the warning signs and risk factors of oral cancers and a panel on the importance of early detection.

Author/Developer: National Institute of Dental Research, National Institutes of Health, Public Health Service, Department of Health and Human Services. Free.

Contact: National Institute of Dental Research, Building 31, Room 2C-35, 31 Center Drive MSC 2290, Bethesda, MD 20892.

2. **Health Care Professional's Guide to Oral Cancer (video, 30 min).** 1995. Approved by several scientific and professional organizations, this video contains a comprehensive multidisciplinary presentation of issues and approaches to treating and rehabilitating patients with oral cancer.

Authors/Developers: National Oral Cancer Awareness Program, sponsored by the American Association of Oral and Maxillofacial Surgeons, the American Cancer Society, and the American Speech-Language-Hearing Association, administered by Spectrum Healthcare Group.

Contact: Dr. Phillip Bonner, Oral Health Education Foundation, P.O. Box 396, Fairburn, GA 30213. 770-969-7400. \$18, including handling and shipping.

3. **What You Should Know About Oral Cancer (video, 8.5 min).** 1994. Pinpoints oral cancer risks and their avoidance. Demonstrates self-examination procedures and emphasizes the need for a multidisciplinary approach to rehabilitation following treatment. One segment features baseball player Cal Ripken, Jr., who explains the hazards of smokeless tobacco. Includes a course guide, which provides background information for an instructor, a summary of the video, discussion questions, answers, and student projects.

Authors/Developers: National Oral Cancer Awareness Program, sponsored by the American Association of Oral and Maxillofacial Surgeons, the American Cancer Society, and the American Speech-Language-Hearing Association, administered by Spectrum Healthcare Group.

Contact: Dr. Phillip Bonner, Oral Health Education Foundation, P.O. Box 396, Fairburn, GA 30213. 770-969-7400. \$12 for the video, including handling and shipping; \$17 for the video and course guide.

## **SECTION 9 HANDOUTS/OVERHEADS**

## **Signs and Symptoms That May Be Oral Cancer**

- Sore in the mouth that bleeds easily and does not heal in about two weeks
- Lump or thickening in the oral soft tissues
- White or red patch on the gums, tongue, or lining of the mouth
- Soreness, hoarseness, or a feeling that something is caught in the throat
- Difficulty in chewing, swallowing, or in moving the lower jaw
- Numbness of the tongue or other area of the mouth
- Swelling of the jaws that causes dentures to fit poorly or be uncomfortable

## **Risk Factors for Oral Cancer**

- Use of tobacco products
- Consumption of alcohol
- Exposure to sunlight (lip)
- Dietary deficiencies, particularly fruits and vegetables

## **Characteristics of People Least Likely to Have Received an Oral Cancer Examination in the Previous Year**

- Black or Hispanic heritage
- Low educational level
- Age 65 or older
- Current status as a smoker
- Low level of knowledge about risk factors for oral cancer

Source: Modified from Centers for Disease Control and Prevention. *MMWR*. 1994;43(11):198–200.

### Survival Rates after 1, 3, and 5 Years for Patients Treated for Oral Cancer

Site	Extent	Patient Survival (%)		
		<u>1 yr</u>	<u>3 yr</u>	<u>5 yr</u>
<u>Tongue</u>				
Base	Localized	92	64	50
	Spread	63	30	22
Oral	Localized	93	76	67
	Spread	66	35	30
<u>Oropharynx</u>	Localized	87	68	53
	Spread	68	38	30
<u>Floor of Mouth</u>	Localized	92	77	68
	Spread	75	49	41
<u>Lip</u>	Localized	99	97	95
	Spread	96	85	78
<u>Gingiva</u>	Localized	94	72	55
	Spread	79	51	44
<u>Buccal</u>	Localized	98	84	78
	Spread	76	49	40

National Cancer Institute: Surveillance, Epidemiology and End Results Program (SEER), 1973–1984. Bethesda, MD. As reported by Silverman, Jr. S. *Oral Cancer*, Table 7-3.



### **SUBTOPIC 3**

#### **RAMPANT INFANT AND EARLY CHILDHOOD CARIES (NURSING CARIES, BABY-BOTTLE TOOTH DECAY)**

##### **TIMELINE (55 minutes)**

5 min	Introduction/Ice Breaker
5 min	Review of Objectives
15 min	Overview
20 min	Review of Case/Questions
10 min	Additional Questions and Activities

### **SECTION 1 LEARNING OBJECTIVES**

Target Group: Nurse practitioners, certified nurse-midwives, physician assistants, practicing clinicians, medical and nursing students, and medical profession trainees.

By the end of this discussion, participants should:

1. Understand the biological and behavioral factors that lead to the development of rampant infant and early childhood caries (dental decay)
2. Know the pattern of dental decay in primary teeth that is indicative of rampant infant and early childhood caries
3. Realize that the prevalence of rampant infant and early childhood caries varies greatly among different ethnic and cultural groups because of differing social norms and feeding practices
4. Know how to prevent rampant infant and early childhood caries and what messages are important for adults to understand in order to decrease its incidence
5. Understand that, because medical care providers are likely to have the opportunity to inspect the teeth of infants and young children before dentists, they are instrumental in identifying rampant infant and early childhood caries, educating parents about prevention, and referring affected children for dental care

## **SECTION 2 ICE BREAKER**

The facilitator asks the participants to form pairs and asks one member of the pair to role-play a parent who does not believe that her young child's decayed primary teeth need to be repaired because all of them will be replaced by permanent teeth. The other member plays a health care provider who explains why it is important to repair these teeth and retain them until they exfoliate naturally. The exercise should last only a minute or two.

The facilitator asks one pair to repeat their "performance" for the group. Other participants should offer additional reasons that were brought up in their own role-playing.

The facilitator may wish to use the handout/overhead "Advantages of Retaining Sound Primary Teeth Until They Exfoliate Naturally" to ensure that the topic is discussed thoroughly.

## SECTION 3 OVERVIEW

Dental decay is an infectious, chronic disease in subjects whose mouths are colonized by *Streptococcus mutans*. These organisms produce acids as by-products when they metabolize ingested foods, principally refined sugars. These acids demineralize tooth tissues. If decay-causing foods are ingested frequently, damage to the teeth results in cavities. The risk of caries is high if inadequate time for remineralization, a naturally occurring repair process, is not provided between decay-causing challenges.

Rampant infant and early childhood caries is a form of severe dental decay that affects the primary teeth of infants and toddlers (see slide). The condition has distinguishing characteristics:

- Many teeth are affected
- Dental decay develops rapidly, often soon after teeth erupt
- Dental decay develops in tooth surfaces that are usually at low risk to dental decay, such as the facial surfaces (those that face the lips) of the upper front teeth and the lingual surfaces (those that face the tongue) of lower back teeth

The pattern of caries development is specifically characteristic of the condition.

While improper nursing bottle feeding habits are the most frequently cited cause of the condition, it may occur in children who are breast-fed at will and in those who are given sweetened pacifiers. In the United States, the vast majority of babies are fed with a nursing bottle, yet most of them do not develop the caries pattern indicative of rampant infant and early childhood caries.

A breast or bottle nipple is pushed by a child's tongue against the palate during sucking. Liquid from a nursing bottle or breast bathes all erupted teeth except for the lower incisors, which are protected by the tongue. Liquid may pool around teeth. If the liquid contains fermentable sugars, they will be metabolized by microorganisms in the mouth, producing organic acids that demineralize the teeth and cause dental decay. If liquids are consumed frequently, teeth may be exposed to cariogenic conditions for lengthy periods with only short intervals for repair or remineralization of demineralized enamel.

Infant milk formulas, bovine milk, and human breast milk contain relatively high concentrations of lactose, a fermentable carbohydrate. Soy-protein formula is free of lactose but, depending on the brand, may contain equivalent concentrations of fermentable carbohydrates, usually sucrose. Sucrose, or common table sugar, is the major decay-causing food substance in the human diet. Natural fruit juices and, particularly, sweetened fruit drinks, Kool-Aid, and soft drinks contain significant concentrations of sugar, and their improper use in infant feeders also may cause dental decay.

Many studies have shown that children with nursing caries have been given bottles of liquids to which sugar or other cariogenic sweetening agents have been added. Some mothers have been reported to give their children pacifiers dipped in sugar solutions or honey, a mixture of two

fermentable carbohydrates (glucose and fructose). This practice also has been associated with infant caries and should be discouraged. Reports show that some mothers feed cereal products diluted with milk or water in nursing bottles, which also can be cariogenic. There is growing concern today that a similar result may occur from giving sweetened medications in feeding bottles to infants and young children.

In nursing caries, the upper primary incisors initially develop a dull white band along the gum line, representing loss of minerals from tooth enamel. As the condition progresses, brown or black cavities develop that girdle the necks of the teeth along the gum line. In advanced cases, the crowns of the four upper incisors may become destroyed completely, leaving only dark root stumps. Lower primary molars are also affected because cariogenic substances supplied by nursing bottles or breast milk tend to pool or stagnate in the area of these teeth if a child falls asleep during nursing. Other primary tooth surfaces may develop dental decay depending on the duration and frequency of a harmful nursing habit.

Particularly harmful is putting a child to bed with a sugar-containing bottle at night, when the child is likely to fall asleep while nursing, and when reparative salivary flow is diminished. Breast-fed infants who sleep with their mothers and can nurse on demand are also highly susceptible. Research has shown that children with early childhood caries are more likely to reside in single-parent households, have insufficient exposure to a systemic source of fluoride, have difficulty sleeping, and have a strong temper. Such research may point to direct cause-and-effect relationships, or it may point to underlying root causes and conditions such as poverty or poor nutrition.

Recent research has shown a correlation between caries in early childhood and low birth weight/nutritional status. Studies in Peru and China have shown that malnourished children have delayed eruption of their primary teeth, but these teeth demonstrate a relatively high prevalence of developmental defects (enamel hypoplasias) and are highly susceptible to dental decay because of the irregularities in tooth enamel surfaces. In a U.S. study, approximately 54 percent of the children 17 to 72 months of age who were less than 2500 grams at birth had enamel defects in their primary teeth, compared with only 15 percent of matched normal birth weight controls. Caries was nearly three times as prevalent among the low birth weight children than in the normal weight children.

It is hard to determine an accurate national prevalence of nursing caries or compare findings in reports because:

- Preschool-age children are not readily accessible for examinations (therefore, examined samples may be biased).
- Infant feeding practices vary in different cultural and ethnic groups, making extrapolation of findings inappropriate.
- Infants and toddlers are difficult to examine thoroughly.
- Criteria for rampant infant and early childhood caries have varied among studies with respect to location of dental decay and number of teeth affected.

Based on available data, it is estimated that this condition affects about 5 percent of children in the United States, but the prevalence may be considerably higher in some subpopulations. *Healthy People 2000*, the Public Health Service's health promotion and disease prevention objectives for the nation, established a goal of increasing to at least 75 percent the overall proportion of parents and caregivers who use feeding practices that prevent rampant infant and early childhood caries by the year 2000 (baseline data were not available when the objectives were published).

The main strategy for preventing nursing caries is to educate prospective and new parents about the condition. Mothers and other caregivers must be taught that putting an infant or young child to bed with a bottle of milk, sweetened liquid, or a honey-dipped pacifier can lead to dental decay. They should be urged to substitute a lidded cup with a spout for a nursing bottle by a child's first birthday. They should be taught that a security blanket or a soft, stuffed animal, accompanied by singing or soft music or holding or rocking the child, is a healthier alternative to a nocturnal bottle. The problem is complex, however, because research has shown that even when mothers know that a feeding practice may lead to dental decay, they continue the practice in order to keep a child quietly in bed.

In communities with high prevalences of rampant infant and early childhood caries, there should be general educational programs about the condition using posters, brochures, and other appropriate health education materials. All prospective parents should be educated in prenatal classes and obstetricians' offices on the causes of and ways to prevent the disease. The message should be reinforced when the child is five or six months of age, just before the primary teeth begin to emerge through the gums. These efforts should focus on appealing to parental concern rather than using fear-arousal techniques.

Efforts to become fully familiar with family structure, communication, and decision-making patterns among culturally diverse groups can strengthen capacity to develop and implement effective educational programs. Ongoing efforts to deepen awareness and knowledge of how cultural issues can impact health services delivery also can strengthen effectiveness of provider and patient or family interactions.

## SECTION 4 CASE STUDY/DISCUSSION QUESTIONS

Your clinic primarily serves migrant farm workers who spend several months a year in California and Oregon harvesting a variety of fruit and vegetable crops. Mrs. Hernandez has brought her 20-month-old son Miguel to your clinic. She and her husband both work, and Miguel is cared for during the day by a teenage baby-sitter.

The chief complaint is that Miguel is often cranky, cries during meals, and indicates that eating is painful, particularly for sweet, hot, or cold foods. Mrs. Hernandez is aware that some of Miguel's front teeth are discolored and parts of his teeth seem to be missing, but she does not understand why. Mrs. Hernandez is not very concerned about Miguel's condition because the affected teeth will be replaced in a few years by permanent teeth.

An oral exam reveals grossly decayed baby teeth and two gum abscesses in areas where caries has reached the pulp chamber. The pattern of carious teeth is compatible with rampant infant and early childhood caries. Upon questioning, Mrs. Hernandez reveals that she still puts Miguel to bed with a bottle of milk or Kool-Aid because he seems to fall asleep sooner and cries less.

She is in her sixth month of pregnancy with her second child, and she regularly attends prenatal classes at your clinic, but her husband rarely attends these sessions.

1. What recommendations would you make to treat Miguel's oral health problem?
2. What advice should you give Mrs. Hernandez to reduce the risk of Miguel's developing additional dental decay and to avoid rampant infant and early childhood caries in her new baby?
3. What educational points should be stressed in prenatal classes to help prospective parents reduce the risk of early childhood caries in their offspring? How might such education be provided in ways that demonstrate cultural awareness and sensitivity?

## SECTION 5 SUGGESTED ANSWERS

1. *What recommendations would you make to treat Miguel's oral health problem?*

Primary teeth should be retained in a healthy state until replaced by permanent successors (see handout/overhead). Mrs. Hernandez is not likely to have insurance to cover the costs of repairing Miguel's teeth. Under Medicaid, it may be possible to identify a dentist who will provide treatment. Many communities or counties, through local dental societies, organize volunteer dentists who provide services at no cost to patients with special financial needs. Other model programs for treating the dental needs of children from families with limited financial resources have been developed by foundations, civic organizations, and medical/dental groups.

Options for treating children with early childhood dental caries depend on the number and severity of decayed teeth and the child's age and likely cooperation. In advanced cases like Miguel's, where evidence exists of tooth pulp involvement, extensive operative procedures like pulpotomies should be done if sufficient tooth structure remains for subsequent restoration. Extractions of severely broken-down teeth are sometimes the only option. A prosthesis to maintain space for orderly eruption of permanent posterior teeth may be warranted.

Treating a young child with extensive lesions can be expensive. Because youngsters cannot be expected to cooperate during the procedures involved, hospitalization and general anesthesia often are required. Most pediatric dentists are experienced in doing hospital-based surgical/restorative procedures. Conventional restorations in a dental office may be possible if cavities are small.

2. *What advice should you give Mrs. Hernandez to reduce the risk of Miguel's developing additional dental decay and to avoid rampant infant and early childhood caries in her new baby?*

The first step in preventing additional decay is to identify the habits that have led to the current condition and eliminate them if possible. Effecting change can be difficult; many parents continue unhealthy feeding and nursing habits even though they are aware of and understand the risks. Health care providers must understand the social and family pressures that may lead to unhealthy feeding practices. It also can be useful to understand the social and family communication and decision-making structures.

Appeal to parental concerns for the health of their children. Putting a child to bed with a nursing bottle may lead to ear infections and to choking. If a parent or caregiver finds it necessary to give a child a bottle at bedtime or with naps, the bottle should contain only water. If a young child is already accustomed to having milk, formula, or sweetened liquid at bedtime, parents or caregivers should be urged to wean the child over a two-week

period by progressively diluting the original liquid in the nursing bottle until it is completely replaced by water.

At Miguel's age, he cannot be responsible for brushing his teeth. His parents or principal caregiver must take responsibility for ensuring that fluoride toothpaste is applied to his teeth twice a day. Only a pea-size dab of toothpaste should be applied to a child-size toothbrush to reduce the risk of excessive fluoride ingestion while teeth are susceptible to developing dental fluorosis (until age six). Miguel should receive dental exams at least once every three months until his rampant caries has been brought under control. Fluoride gel or varnish applications should be considered. If Miguel's drinking water is fluoride-deficient, a daily dietary fluoride supplement should be prescribed. Analyses of fluoride concentrations in drinking water are performed by many state health departments and state medical or dental schools. Fluoride supplements require prescriptions. The monitoring of compliance in taking prescribed fluoride supplements is essential for success.

As soon as an infant begins to erupt teeth at about six months of age, the teeth should be wiped off daily with a soft cloth or child's sock until the use of a toothbrush (with a dab of fluoride toothpaste) is feasible.

3. *What educational points should be stressed in prenatal classes to help prospective parents reduce the risk of early childhood caries in their offspring? How might such education be provided in ways that demonstrate cultural awareness and sensitivity?*

Prospective parents should be taught what causes rampant infant and early childhood caries, how to detect the condition, and how to prevent it. Prospective parents should be told that they can demonstrate love for their children without putting them to bed with a bottle or honey-dipped pacifier or giving them candy. Prospective parents must be taught that the purpose of feeding an infant or young child is to nourish, not to pacify. With perseverance, an infant will get used to any routine. It should be stressed that it is best to feed young children and then put them to bed, not feed them in bed. It may be useful to inquire about feeding and sleeping practices used in the past in order to determine whether traditional approaches might be adapted to meet current needs.

In communities with high prevalences of nursing caries, all parents of child-bearing age should be educated about the problem. In populations in which the condition is less prevalent, educational programs should be provided only for prospective parents who already have a child with the condition. Surrogate caregivers, such as baby-sitters or grandparents, may also contribute to the problem and should be educated.

Infection of children with *Streptococcus mutans*, the microorganism thought to cause dental caries, is transmitted by principal caregivers sometime after children's primary teeth erupt. This may occur when children and caregivers use the same utensils or dishes without proper washing, when caregivers taste food given to children, and when objects that are put in the mouth, such as toothbrushes, are shared. In some cultures, mothers



premasticate food for babies. Transmission may be particularly likely when the principal caregiver is highly infected or when the household is crowded. To reduce the chance of transmission, parents should be urged to reduce their own concentrations of cariogenic bacteria by having dental decay repaired, using fluoride toothpastes, and practicing good oral hygiene.

Parents should be taught in prenatal classes how to identify dental decay in their own mouths and in their children's' mouths. They should be taught to inspect the teeth of their children regularly and look for signs of early developing decay (white-spot lesions), an indication of enamel demineralization from frequent exposure to sugars. Parents should be urged to take their child at about one year of age to a dentist who works with children for a well-baby dental visit, or sooner if they detect something unusual in their child's mouth. Prenatal educators should become aware of economic issues related to access to dental care in their areas and may find it useful to develop knowledge of locally available referral programs and resources.

## **SECTION 6 SUGGESTED ACTIVITY**

Select two participants for a role-play. Ask one to play the mother of an 18-month-old child who engages in unhealthy feeding practices. Ask the other to play a health care provider who, by asking questions, ascertains whether dietary practices are conducive to early childhood caries. Ask the other participants to critique the role-play.

### **Situation for Role-Playing the Mother**

You are the pregnant mother of 5 children who range from 18 months to 9 years of age. You share an apartment with your husband's parents in a large city. Your husband works nights and thus sleeps for several daytime hours. Although you have been told by friends that putting an infant to bed with a bottle of formula or milk may be harmful to the child's teeth, you find it hard to believe that a healthy product can be damaging. You often gave your children formula when they were infants and later milk in nursing bottles when they took naps or were put to bed. Occasionally, you gave them a pacifier dipped in honey if it was not feeding time in order to quiet them. Recently, a few times when you have tried to stop these practices, your child has cried for lengthy periods, which has angered your husband who was trying to sleep.

Your mother-in-law sees nothing wrong in giving a honey-dipped pacifier to your youngest or putting him to bed with a bottle of milk. Your in-laws ply all your children with candy to show their love.

When told that all your children have many cavities, you do not really understand that you may be contributing to their oral health problems.

### **Situation for Role-Playing the Health Care Provider**

You have examined the mouths of all the children of this mother as part of routine medical examinations and discover that the youngest child has a pattern of dental decay of his primary teeth typical of rampant infant and early childhood caries. All of the older children also appear to have several decayed teeth. Some of them have gum abscesses adjacent to the root ends of the affected teeth. The children have only a few fillings; most of the dental decay is untreated.

Question the mother about the feeding and oral hygiene practices of her children, herself, and her husband, and explain to her the reasons she should not put her youngest child to bed with a bottle of milk or use a honey-dipped pacifier. Try to convince her not to continue her current practices for her forthcoming child. Also advise her about the use of fluoride products that will help prevent further dental decay.

Try to imagine the living conditions of the mother and her extended family and the pressures that must exist in rearing her children.

## SECTION 7 SUGGESTED READING

1. Johnsen D, Nowjack-Raymer R. Baby bottle tooth decay: Issues, assessment, and an opportunity for the nutritionist. *J Am Dietetic Assoc.* 1989;89:1112–1115.  
This paper stresses that dietitians can identify children at risk for early childhood caries, teach parents to recognize the disease, and help them stop bedtime bottles.
2. Kaste LM, Gift HC. Inappropriate infant bottle feeding—status of Healthy People 2000 objective. *Arch Pediatr Adolesc Med.* 1995;149:786–791.  
Provides information on baby bottle use from the 1991 National Health Interview Survey. Findings show that 95 percent of children 6 months to 5 years of age have used a baby bottle, and that nearly one-fifth have been put to bed with bottles with contents other than water. The authors conclude that this high prevalence emphasizes the key role of medical care personnel in reducing the health risks.
3. Kelly M, Bruerd B. The prevalence of baby bottle tooth decay among two Native American populations. *J Public Health Dent.* 1987;47:94–97.  
Presents data and discussion of the causes for the high prevalence of early childhood caries in population groups in two states.
4. Marino RV, Bomze K, School TO, et al. Nursing bottle caries: Characteristics of children at risk. *Clin Pediatr.* 1989;28:129–131.  
This study found that children with early childhood caries were more likely to live in a single-parent household, have sleep trouble and strong tempers, were taking nursing bottles to bed, and had less exposure to fluoride than controls.
5. Ripa LW. Nursing caries: A comprehensive review. *Pediatr Dent.* 1988;10:268–282.  
All aspects of rampant infant and early childhood caries are discussed in depth: clinical appearance, etiology, prevalence, prevention, and treatment.
6. Schulte JR, Druyan ME, Hagen JC. Early childhood tooth decay: Pediatric interventions. *Clin Pediatr.* 1992;31:727–730.  
Although pediatricians generally believe they inspect the mouths of young children and offer sound nutritional advice, many are unaware of early childhood caries and the associated dietary patterns, according to this article.
7. Serwint JR, Mungo R, Negrete VF, et al. Child-rearing practices and nursing caries. *Pediatr.* 1993;92:233–237.  
This report of a cross-sectional study relates the presence of caries in children 18 to 36 months of age to current bottle feeding, mother's education, previous breast feeding, use of fluoridated drinking water, and maternal caries.

## SECTION 8 RESOURCES

1. **Baby Bottle Tooth Decay.** These instructional handout sheets are in Spanish, with simple text, bold graphics, and photographs. They explain how to prevent rampant infant and early childhood caries.

Contact: The American Dental Association, 211 East Chicago Avenue, Chicago, IL 60611, 800-947-4746. Pads of 50 tear-off sheets, \$5.00 per pad; 10 pads, \$40.00 for ADA members. Prices are 40 percent higher for non-members.

2. **Baby Bottle Tooth Decay (video, 18 min).** Though less visually interesting than the video described in item 4, this video depicts in greater detail the need for fluorides and the steps for weaning a child from a bottle. In English or Spanish.

Contact: BBTD Video Order, Nutrition Services Coordinator, Economic Opportunity Commission, 1030 Southwood, San Luis Obispo, CA 93401. 805-544-4355. \$39.50 plus \$3.50 shipping and handling; \$10 for previewing, applied to purchase.

3. **Baby Bottle Tooth Decay (video, 5 minutes).** This Spanish video defines baby bottle tooth decay and its causes and demonstrates how parents can care for their baby's teeth.

Contact: The American Dental Association, 211 East Chicago Avenue, Chicago, IL 60611, 800-947-4746. \$40 for ADA members; 40 percent higher for non-members.

4. **Baby Bottle Tooth Decay: A Professional's Guide (video, 13 min).** 1992. Targets health professionals and child care providers. Offers information to help educate parents and other caregivers about prevention, intervention, and the causes and effects of rampant infant and early childhood caries.

Authors/Developers: Oral Health Action Committee—California Healthy Mothers Healthy Babies in cooperation with the Dental Health Foundation and the U.S. Public Health Service, Region IX.

Contact: Dental Health Foundation, 4340 Redwood Highway, Suite 319, San Rafael, CA 94903. 415-499-4648. Available for loan or purchase, \$29.50 plus \$3 shipping.

5. **Baby Bottle Tooth Decay Brochure Series.** These culturally sensitive, field-tested brochures on rampant infant and early childhood caries have been developed for low reading level populations. Available in English, Spanish, Chinese, Vietnamese, Cambodian, Laotian, and Thai languages.

Contact: Dental Health Foundation, 4340 Redwood Highway, Suite 319, San Rafael, CA 94903. 415-499-4846. From \$0.11 to \$0.16 per copy, depending on quantity ordered; shipping charge varies depending on quantity and location. Free samples available.

6. **A Healthy Mouth for Your Baby.** NIH Publication No. 95-2884. This easy-to-comprehend, eight-page brochure provides basic information for parents and caregivers on how to check and clean their babies' teeth and prevent rampant infant and early childhood caries. It also discusses the importance of fluorides.

Contact: National Institute of Dental Research, P.O. Box 54793, Washington, DC 20032; or call Mary Daum: 301-496-4261. Free.

7. **Preventing Baby Bottle Tooth Decay.** This poster is suitable for pediatricians' offices, well-baby clinics, health centers, dental offices/clinics, and preschool programs. Available in English or Spanish.

Contact: National Institute of Dental Research, P.O. Box 54793, Washington, DC 20032. Free.

8. **Prevention: Ages 1–5 (video, 6 min).** Teaches parents about tooth eruption, baby bottle tooth decay, fluoride, and home care.

Contact: The American Dental Association, 211 East Chicago Avenue, Chicago, IL 60611, 800-947-4746. \$40 for ADA members; 40 percent higher for non-members.

## **SECTION 9 HANDOUTS/OVERHEADS**

## **Advantages of Retaining Sound Primary Teeth until They Exfoliate Naturally**

- Important for good overall general health. Decayed teeth may cause pain, abscesses, and infections.
- Enhances self-image. Decayed or missing primary teeth may cause child to be self-conscious and reluctant to smile.
- Important for speech and good enunciation.
- Improves ability to chew and may affect food acceptance.
- Maintains sufficient space in the jaws for the orderly and complete eruption of succeeding permanent teeth.
- Avoids risks of necessary hospital-based restorations and extractions under general anesthesia.
- Eliminates need for expensive restorative or surgical procedures.

## **Suggested Contents of an Educational Program on Rampant Infant and Early Childhood Caries for Prospective or New Parents**

1. Parents should be questioned about the feeding habits of their young children, especially whether they are put to bed with a bottle that contains liquids other than water, can nurse on demand, or if they are given sweetened pacifiers.
2. Parents should be educated about the relationship between early severe dental decay in their children and the risk factors that lead to the problem.
3. Parents should be urged to feed infants only when they are being held; prolonged night nursing (bottle or breast) should be avoided.
4. If parents believe it is necessary to give a bottle with naps or at bedtime, the bottle should contain only water.
5. Parents should be instructed to clean an infant's teeth with two -by-two inch gauze squares, a soft damp cloth, a clean infant's sock, or a small, soft -bristled toothbrush after feeding.
6. Weaning from the breast or a formula bottle should begin as soon as feasible.
7. Parents should be instructed that after weaning, they should restrict the amount and frequency of the child's sucrose consumption.
8. Parents should be urged to have their own carious tee th repaired, as well as those of other family members and other principal caregivers. The risks of close oral contacts between caregivers and infants after teeth erupt should be stressed.



## **Caries-Preventive Methods for Young Children with Rampant Infant Early Childhood Caries**

1. Dietary change should be implemented to reduce the amount and frequency of refined sugar consumption.
2. If drinking water does not contain sufficient concentrations of fluoride, the child should be placed on a daily regimen of dietary fluoride supplements, and compliance must be monitored.
3. Oral hygiene instructions for good home care should be given to the child and parents. American Dental Association-accepted fluoride toothpastes should be used by all family members. Because most young children cannot control their swallowing, only very small quantities of toothpastes should be placed on the toothbrushes of children younger than school age. Chronic overingestion of fluoride may lead to dental fluorosis.
4. For children old enough to tolerate professional fluoride treatments, fluoride solutions, gels, or varnishes should be applied every three months. The interval between treatment may be lengthened to every six months after new decay has not developed for two years.
5. Commercially available fluoride mouth rinses should be recommended, but only for children six years of age or older, because preschool-age children may not be able to control swallowing of the rinse.
6. When a child reaches about age six or seven, dental sealants should be applied to the biting surfaces of first permanent molars that have pits and grooves.

## **SUBTOPIC 4**

### **RATIONAL USE OF FLUORIDES AND SEALANTS FOR INDIVIDUALS AND COMMUNITIES**

#### **TIMELINE (50 minutes)**

5 min	Introduction/Ice Breaker
5 min	Review of Objectives/Format
15 min	Overview
20 min	Review of Cases/Questions
5 min	Additional Questions and Activities

#### **SECTION 1 LEARNING OBJECTIVES**

Target Group: Physicians, nurses, nurse practitioners, physician assistants, nurse-midwives, and trainees/students in all these disciplines.

By the end of this discussion, participants should:

1. Understand why dental decay, particularly in children, has declined so greatly during the past 25 years in the United States and most other developed countries
2. Understand why the decline in dental decay has not occurred in all localities or all population subgroups
3. Explain why everyone should have a regular source of systemic fluoride during the period when teeth are developing
4. Provide factual information to patients and community leaders on why all cities with fluoride-deficient public water supplies should fluoridate their water
5. Offer suggestions for alternative methods of primary caries prevention for communities that do not or cannot fluoridate their water
6. Identify the risks of developing dental fluorosis from the chronic ingestion of excessive amounts of fluoride during the period when teeth are forming
7. Teach parents of preschool children about children's proper use of fluoride toothpastes

8. Recognize the value of pit-and-fissure sealants in newly erupted permanent molars
9. Realize the roles of all health professionals in promoting community water fluoridation and the implementation of school-based fluoride programs

## **SECTION 2 ICE BREAKER**

This exercise is designed to get participants to think about primary preventive methods for dental decay. The facilitator hands out sheets of paper and asks the participants to write the following procedures in a column:

- Toothbrushing
- Consuming a nutritious diet
- Placing dental sealants
- Abstaining from foods that contain sugar
- Using fluorides
- Using dental floss

Participants rank the procedures according to how effective they are as primary caries preventive methods for use in public health or community programs. Two or three participants present their rankings, with group discussion after each presentation.

The facilitator should make the following points if they are not brought up in discussion:

- Hundreds of studies have shown the powerful decay-preventing effects of the fluorides in drinking water and dental products.
- Dozens of studies have shown that dental sealants, by forming a protective barrier on the biting surfaces of molar teeth, prevent dental decay.
- Toothbrushing and the use of dental floss are very important for the maintenance of healthy gingival tissues, but research has not shown that mechanical plaque removal per se prevents dental decay.
- Theoretically, eliminating sugar-containing products from the diet can reduce or prevent the incidence of dental decay, but we are too fond of sweets, and too many sugars are "hidden" in foods and beverages to consider dietary control a feasible method of community dental decay prevention.
- Except in extreme cases of malnourishment, a nutritious diet is not related to dental decay formation.

### SECTION 3 OVERVIEW

A dramatic decline in the prevalence of dental caries has occurred in U.S. school-age children during the last 50 years. Local surveys of schoolchildren conducted in the 1940s showed that children ages 5 through 15 averaged about 10 decayed, missing (because of extraction), or filled permanent tooth surfaces (DMFS). Large national surveys conducted by federal agencies have shown that average DMFS scores for children of the same ages had plummeted to about six by the early 1970s, four by 1980, and just over two by 1987. The same national surveys show that the percentage of schoolchildren without evidence of past or current caries in their permanent teeth rose from 28 percent in the early 1970s to 37 percent by 1980 and to 50 percent in 1987.

The pattern of dental decay also has changed. In the 1950s and 1960s, about one-third of dental decay occurred in tooth surfaces that touch one another (approximal surfaces). The most recent national survey of the dental status of U.S. schoolchildren showed that only 12 percent of DMFS prevalence affected approximal tooth surfaces.

Years ago, it was not unusual for high school graduates or young adults to require full dentures because their teeth had decayed to the point where full-mouth tooth extractions were necessary. Today, one rarely observes children or young adults in the United States in such a calamitous state of oral health.

Based on epidemiologic surveys conducted in the late 1930s and early 1940s, it became apparent that children who lived in communities with fluoride occurring naturally in their drinking water had far fewer decayed teeth (about 50 to 65 percent) than did children who lived in communities with negligible concentrations of fluoride. These studies showed that in areas that had a concentration of about one part fluoride to one million parts of water (1 ppm), dental decay was greatly lower than in fluoride-deficient areas. The studies observed only minimal amounts of dental fluorosis, a condition that may occur from chronic ingestion of excessive fluoride during the period when teeth are forming in the jaws. In January 1945, Grand Rapids, Michigan, became the first city in the world to adjust the concentration of fluoride in its drinking water to an optimal level for the prevention of dental decay.

Since water fluoridation first was implemented as a caries preventive measure in the United States, the development and use of other fluoride agents have expanded greatly.

- Dietary fluoride supplements have been available by prescription as alternative sources of fluoride for areas with fluoride-deficient drinking water.
- Several fluoride solutions, gels, and varnishes have been developed for professional application.
- Fluoride-containing toothpastes have been marketed in the United States since the 1950s and now make up well over 95 percent of toothpaste sales.
- Fluoride mouth rinses are used in school-based programs (see slide) (as are fluoride tablets, where appropriate). Mouth rinses with dilute concentrations of fluoride are sold over the counter.

The use of each of these fluoride delivery systems is supported by a large body of research. Evidence indicates that various combinations of these methods produce additive benefits in reducing the incidence of caries, although there is a diminishing return from exposure to multiple sources of fluoride. Nevertheless, dental decay among U.S. school-age children has declined overall by 75 percent or more during the past 20 to 30 years.

Not all segments of the U.S. population have benefited uniformly from reduced dental decay. Inner-city schoolchildren in impoverished neighborhoods, Native American children, and children from migrant families have much higher prevalences of dental decay than the average. In contrast, evidence indicates that some children who live in more comfortable economic circumstances may be receiving too much fluoride during the first six years of life. Several reports have indicated increasing prevalences and, to a lesser extent, intensities of dental fluorosis in both fluoridated and unfluoridated communities.

Dental sealants are liquid resins or plastic materials that are placed on the pits and grooves of the back (posterior) teeth, are hardened chemically or with various light sources, and bond with tooth enamel to provide a protective barrier against dental decay (see slide). Because nearly all dental caries in permanent teeth of most children today occurs in the pits and grooves of chewing surfaces of the posterior teeth, dental sealants now have increased importance in caries prevention.

## SECTION 4 CASE STUDY/DISCUSSION QUESTIONS

A statewide epidemiologic survey of children in grades 1, 6, and 10 has shown that dental decay in Emerald City, a community with approximately 105,000 residents, is considerably higher than state and regional averages. The data reveal that the average number of decayed, missing (because of extraction), and filled tooth surfaces (DMFS) for the city's 15-year-olds is 8.31, whereas the state average DMFS for this age is 5.72. Similar relative findings are observed for children in grade 6 and, for primary teeth, for children in grade 1.

Emerald City's population is approximately 30 percent black, 61 percent white (about one-third of whom are Hispanic), and 9 percent other (mostly recent Asian immigrants). The city has a few small manufacturing plants but no major industries. Wages are generally low.

The natural fluoride concentration of Emerald City's water is 0.2 parts per million (ppm). A group of local dentists, other health professionals, and community leaders attempted to implement community water fluoridation by placing the issue as a special referendum item in 1969. The measure was defeated by a wide margin, although few residents voted.

The community does not have any school-based programs for the prevention of dental decay. Dental sealants are not offered by many of the city's 20 practicing dentists, except for one pediatric dentist who uses them widely in children with newly erupted permanent molars. The pediatric dentist also prescribes dietary fluoride supplements for the majority of her patients. Three pediatricians in the community also prescribe fluoride supplements, usually as part of vitamin-fluoride preparations.

1. What basic approach to preventing dental decay is most feasible to reduce dental decay among children in Emerald City?
2. How does fluoride work to prevent dental decay?
3. What is the present status of community water fluoridation in the United States, and why is it considered an ideal public health method?
4. Is community water fluoridation less effective today than it was in the past?
5. Why do some groups of children often have a serious problem with dental decay?
6. What factors have been associated with the development of dental fluorosis, and what advice should be provided to parents to avoid the risk of dental fluorosis in their children?
7. What alternative caries-preventive programs should be implemented in Emerald City until water fluoridation is adopted by the community?

8. What are the best ages to place dental sealants for children?
9. Why is the prevention of root surface caries receiving increased attention?



## SECTION 5 SUGGESTED ANSWERS

1. *What basic approach to preventing dental decay is most feasible to reduce dental decay among children in Emerald City?*

Three basic approaches exist for the prevention of dental decay (caries):

- Remove or reduce the mat of microbial plaque on teeth on a regular basis using various mechanical means (toothbrushes and dental floss) or chemical agents (antibacterial mouthwashes)
- Modify or control dietary practices by reducing the frequency of consuming refined carbohydrates (sugars)
- Increase the resistance of teeth through the use of various fluoride delivery systems or with adhesive pit and fissure sealants

Everyone with teeth should use a fluoride-containing dentifrice that bears the seal of the American Dental Association, indicating that the product is safe and effective. Everyone should try to reduce the frequency of consuming foods containing sugars, because each time refined carbohydrates are consumed, decay-causing acids are produced by bacteria harbored in dental plaque. However, because Americans largely have become a society of frequent snackers with a proclivity for sweets, a dietary control approach to caries prevention cannot be considered a feasible public health method to prevent caries.

The most feasible individual and public health approach to caries-prevention is the rational use of fluorides and sealants.

2. *How does fluoride work to prevent dental decay?*

Fluoride works in several ways:

- Systemic: When ingested, fluoride is absorbed from the gastrointestinal tract, circulates through blood, and is deposited in bone and teeth that are developing in the jaw, making them more resistant to acids that are produced when refined carbohydrates (sugars) are consumed.
- Topical: Topically applied fluoride produces a host of antibacterial effects which, depending on concentration, can kill microorganisms in the mouth and interfere with their metabolism, their ability to adhere to teeth, their reproduction, and/or their ability to produce acid.
- Remineralization: Fluoride facilitates the remineralization of enamel that has been demineralized by acids produced by bacteria.

More than one of these mechanisms may operate simultaneously.

3. *What is the present status of community water fluoridation in the United States, and why is it considered an ideal public health method?*

Most recent estimates indicate that about 133 million persons, or 53 percent of the U.S. population, live in approximately 10,000 communities with sufficient concentrations of fluoride in their drinking water for optimal dental health. Nearly all of these communities adjust the natural fluoride content of their water to concentrations that range from 0.7 to 1.2 ppm, depending on their average yearly temperatures. A range is used because water consumption varies according to a community's temperature. (Some areas in the United States lack central water supplies. The population with fluoridated water as a percentage of those who live in areas with central water supplies is approximately 64 percent.)

Community water fluoridation has several attributes that make it nearly an ideal public health method. It is an inexpensive and highly effective way to reduce dental caries in large groups of people. As shown by hundreds of studies and analyses, it is eminently safe. It reaches everyone regardless of age, socioeconomic status, educational level, or any other social variable. Benefits are derived without a conscious effort by the beneficiaries. The health benefits continue throughout life if consumption of fluoridated water continues. Moreover, the costs for restorative dental care are greatly reduced.

4. *Is community water fluoridation less effective today than it was in the past?*

Community water fluoridation is just as effective today as it ever was, particularly in geographic areas where other fluoride agents are not widely available or among population subgroups who are not exposed to fluoride agents in dental products or in dental offices. The implementation of water fluoridation has been more successful in larger rather than in smaller communities; approximately 70 percent of all U.S. cities with populations of more than 100,000—including 42 of the 50 largest cities—fluoridate their water. Many of these large cities are likely to have soft drink bottling and food processing plants. The soft drinks and many of the processed food products contain varying functional concentrations of fluoride, because they are prepared with fluoridated water. These foods and beverages are not only consumed in the city of manufacture, but are distributed to areas with fluoride-deficient water supplies. Regular consumption of these products in nonfluoridated areas provides a diffusion effect of fluoridated drinking water.

Dietary fluoride supplements are designated for use in areas with insufficient concentrations of fluoride in water. The other products and preventive services that incorporate fluoride are intended for use by people in nonfluoridated and fluoridated communities. The results are protection from dental decay throughout the country and diminished differences in the levels of dental decay between fluoridated and nonfluoridated communities.

Community water fluoridation returns approximately \$50 in reduced dental decay for every dollar invested. The benefits are particularly pronounced for children who must rely on drinking water to supply their main source of fluoride.

5. *Why do some groups of children often have a serious problem with dental decay?*

It is impossible to ascribe with certainty the reasons that some groups of children may develop more dental decay than others. The causes undoubtedly are multifactorial.

The reasons include differences in dietary practices, especially the frequency of consuming refined carbohydrates, and other behaviors that may affect dental decay. Many children from impoverished families do not have fluoride toothpastes in their homes, do not receive professional preventive services, and are unlikely to take dietary fluoride supplements. Many may not have toothbrushes or must share them with other family members.

6. *What factors have been associated with the development of dental fluorosis, and what advice should be provided to parents to avoid the risk of dental fluorosis in their children?*

The early epidemiologic studies of the relationship between fluoride in water and dental fluorosis showed that about 10 to 15 percent of persons born and reared in communities with about 1 ppm of fluoride in drinking water would have signs of mild forms of dental fluorosis. Recently observed increases of fluorosis in children are not surprising when one considers all the additional sources of fluoride that are available today that were not available in the 1930s and 1940s, prior to the introduction of fluoridation.

Factors that have been shown to be associated with increased fluorosis are the early use of fluoride toothpastes, the use of dietary fluoride supplements and their misuse in fluoridated areas, and prolonged consumption of infant formula. A recent analysis showed that more than 60 percent of fluorosis today is caused by sources of fluoride other than drinking water, and that if fluoride were removed from all water supplies, dental fluorosis would be reduced by only 13 percent.

7. *What alternative caries-preventive programs should be implemented in Emerald City until water fluoridation is adopted by the community?*

Pediatricians and dentists in Emerald City should be encouraged to prescribe dietary fluoride supplements for their patients between 6 months to 16 years of age. The dosage for supplements depends exclusively on a child's age and the fluoride concentration of the child's principal source(s) of drinking water. For children who live in areas surrounding Emerald City, the fluoride concentration of drinking water wells must be determined before the proper dosage of fluoride is prescribed.

School officials and health department personnel should be encouraged to implement a school-based daily fluoride tablet and/or weekly fluoride mouth rinsing program. Such programs have been shown repeatedly to reduce the prevalence of dental decay by 30 to 40 percent among groups of students at risk for caries. Schools should be encouraged to continue fluoride programs into junior high school and high school, because teenagers with full complements of permanent teeth (other than third molars) are particularly prone to dental caries development.

Teachers, after receiving in-service training, are able to supervise school-based fluoride programs. The costs of these programs are minimal. All supplies needed for a school-based fluoride mouth rinsing program cost less than \$2 per child per year. The current costs for a fluoride tablet program are similar.

8. *What are the best ages to place dental sealants for children?*

Although fluoride is effective in reducing dental decay in all types of tooth surfaces, it is most effective in preventing caries in the smooth surfaces of teeth, i.e., those that touch one another (approximal tooth surfaces), and those that face the lips or cheeks (buccal surfaces) or the tongue (lingual surfaces). The majority of cavities today occur in the surfaces of teeth with pits and grooves, principally the irregular surfaces of molars. These surfaces are difficult to clean. Dental plaque, which harbors decay-causing bacteria, accumulates in these pits and grooves. Consequently, the biting surfaces of permanent molars are particularly prone to decay in caries-active children.

Dental sealants are liquid plastic materials that are applied to the pits and grooves of teeth after slightly etching the enamel. They are hardened chemically or with various light sources and adhere closely to the underlying tooth enamel. Sealants form a physical barrier, which prevents bacterial acids from reaching these caries-susceptible tooth surfaces. It is important to seal molars soon after their full eruption into the mouth, before dental decay has begun to develop.

Generally, all four first permanent molars fully erupt into the mouth at ages six or seven. Consequently, sealants should be placed in children shortly after these teeth erupt and ready access to the entire biting surface is afforded. The four second permanent molars generally erupt in children at ages 12 or 13. These ages provide another prime time to apply sealants to protect these teeth from decay. Other tooth surfaces with deep pits and/or fissures may be sealed at the same time.

If sealants are placed properly, the majority will be retained for many years. Although the bulk of material may undergo gradual wearing away by the attrition of biting and chewing, critical areas in the deepest recesses where dental decay most often develops remain protected by sealant material.

9. *Why is the prevention of root surface caries receiving increased attention?*

The reduction of dental caries prevalence that has been occurring in the United States for the past 25 to 30 years has resulted in a greater number of adults who have retained all or most of their teeth. As people age, most of them experience recession of the gums, which exposes the root surfaces of teeth. Periodontal disease exacerbates the problem. Root surface decay has been recognized as a serious problem in many persons who experience gingival recession.

Fluoride has been shown to prevent root surface decay. For example, research shows that adults who live in fluoridated communities experience much less root surface caries than do similar aged adults who live in communities with low fluoride concentrations in drinking water. Other studies show that topically applied fluoride mouth rinses and gels and the use of fluoride toothpastes reduce the incidence of dental decay on the root surfaces of teeth.

## **SECTION 6 SUGGESTED ACTIVITIES**

Ask one participant to portray a city council member of a town that will soon consider whether to fluoridate its drinking water. She has heard allegations that fluoride is a pollutant, causes cancer, and affects the immune system, thus increasing susceptibility to AIDS. Ask another participant to play a health professional and respond to these issues, which are raised by the city council member during a social gathering. Ask other participants to critique the responses of the health care professional.

Break the class into pairs. Ask one person in each pair to be the health care provider and the other to be Mrs. Henderson, the mother of a two-year-old child who began to encourage the child to brush her teeth after meals about six months previously. Ask each to role-play their concerns about proper oral care procedures for the child.

### **Situation for the Role-Play**

The Hendersons live in a middle-class, suburban community that receives its water from a large nearby city, which began to fluoridate its drinking water about 20 years ago. The Hendersons are both in their late 30s. They both developed many cavities in their teeth as children and adolescents. Mrs. Henderson is determined that their daughter will have good teeth. After their daughter was born, she asked her daughter's pediatrician about vitamin supplements with fluoride, and he had prescribed such a product without realizing that the Hendersons lived in a fluoridated community.

Mrs. Henderson assiduously reads articles concerned with health in magazines and newspapers. She is aware of the benefits of fluorides, and began to teach her daughter at a young age to brush her teeth with fluoride toothpaste after meals and before going to bed. She supervises this routine closely.

The health care provider realizes that the child is inappropriately receiving a daily dietary fluoride supplement because the child already is consuming fluoridated drinking water. The provider realizes that this practice, combined with the frequent use of a fluoride toothpaste, poses a serious risk of dental fluorosis.

The health care provider should think about how to counsel Mrs. Henderson about her improper use of fluoride supplements for her child and offer advice on the proper use of fluoride toothpastes by two-year-old children—without diminishing Mrs. Henderson's enthusiasm for ensuring good oral health for her child.

## SECTION 7 SUGGESTED READING

1. Council on Access, Prevention and Interprofessional Relations, American Dental Association. Caries diagnosis and risk assessment—a review of preventive strategies and management. *J Am Dent Assoc.* 1995;126:1S–24S.  
Provides information on assessing patient risks for dental decay and suggests methods to reduce that risk. It stresses treating caries as an infectious disease, personalizing preventive procedures, and continuing assessments of caries risk factors throughout life.
2. Council on Community Health, Hospital, Institutional and Medical Affairs, American Dental Association. *Water Fluoridation Campaign Manual—Nature's Idea: Fluoridation.* Chicago, IL: American Dental Association; 1990.  
This monograph is a guide for those interested in implementing local water fluoridation campaigns. It describes strategies for researching a community, timing a campaign, and persuading city officials.
3. Edelstein BL, Douglass CW. Dispelling the myth that 50 percent of U.S. schoolchildren have never had a cavity. *Public Health Rep.* 1995;110:522–530.  
Emphasizes that the highly publicized statistic from the latest national survey of the dental health status of U.S. schoolchildren, which stated that 50 percent have never had a cavity, fails to consider decay in primary teeth. Also summarizes several survey findings to show that caries experiences vary widely among individual children and among population subgroups, being particularly high in minority, low-income, and underserved groups.
4. Horowitz HS. The need for toothpastes with lower than conventional fluoride concentrations for preschool-age children. *J Public Health Dent.* 1992;52:216–221.  
This review stresses that typical preschool-aged children inadvertently or intentionally swallow large proportions of the toothpaste they use for toothbrushing, most of which contains fluoride. Toothbrushing by school-aged children should be supervised closely, and pediatric fluoride toothpastes with lower concentrations of fluoride should be made available in the United States, as is done in many other developed countries.
5. Pan American Health Organization (PAHO). *Oral Health for a Healthy Life.* (Resource Booklet for World Health Day—April 7, 1994). Washington, DC: PAHO; 1994.  
This 35-page monograph emphasizes the importance of oral health to total health, summarizes the oral health problems faced by different age groups in the United States, and the risk factors for each. It reviews the oral health objectives for the Oral Health 2000 and Healthy People 2000 campaigns and targets disease prevention/health promotion programs to meet them.

6. Ripa LW. A critique of topical fluoride methods (dentifrices, mouth rinses, operator- and self-applied gels) in an era of decreased caries and increased fluorosis prevalence. *J Public Health Dent.* 1991;51:23–41.  
Stresses that care and supervision should be given to children younger than age six who routinely use fluoride products to reduce the risk of their ingesting excessive fluoride and developing dental fluorosis.
7. Ripa LW. Sealants revisited: An update of the effectiveness of pit-and-fissure sealants. *Caries Res.* 1993;27(Suppl 1):77–82.  
Summarizes the effectiveness of the three generations of pit-and-fissure dental sealants that have been used since 1967. The recent innovation of incorporating fluorides into sealant materials has the potential of inhibiting demineralization and promoting remineralization of underlying enamel and of tooth structure at the margins of sealants.



## SECTION 8 RESOURCES

1. **Community Water Fluoridation: The #1 Way to Prevent Dental Decay.** This eight-page illustrated brochure is designed to help communities obtain or retain community water fluoridation. It describes the health benefits of the procedure, explains why fluoridation is an ideal public health method, and provides information on how to determine if a community is fluoridated.

Author/Developer: American Association of Public Health Dentistry (AAPHD).

Contact: AAPHD National Office, 10619 Jousting Lane, Richmond, VA 23235. From \$0.50 per copy for less than 100 to \$0.25 per copy for 500 or more, including postage.

2. **Fluoridation Facts.** This 40-page handbook for participants in community water fluoridation campaigns contains questions and in-depth answers about fluoride, its benefits, efficacy, and safety.

Author/Developer: American Dental Association.

Contact: American Dental Association, 211 East Chicago Avenue, Chicago, IL. \$5 each, 10–24 for \$4 each, 25–99 for \$3 each, 100 or more for \$2.50 each.

3. **Fluoridation: The Facts and the Challenge (video, 16 min).** Discusses the safety, effectiveness, and need for community water fluoridation through interviews with the U.S. Surgeon General, scientific authorities, and others.

Author/Developer: American Dental Association.

Contact: American Dental Association, 211 East Chicago Avenue, Chicago, IL. VHS \$68.

4. **Preventing Tooth Decay: A Guide for Implementing Self-Applied Fluorides in School Settings.** NIH Publication No. 82-1196. Although published in 1981, this 40-page document remains the most comprehensive guide on launching school-based fluoride mouth-rinsing and fluoride tablet programs. It covers topics ranging from determining appropriate programs and obtaining necessary support to monitoring procedures and adjunct education.

Author/Developer: Alice Horowitz, National Institute of Dental Research, National Institutes of Health.

Contact: NIDR/NIH Building 45, Room 3AN-44B, Bethesda, MD 20817. Only photocopies available. Free.

5. **Seal America: The Prevention Invention.** This video and manual set explains how to establish a school-based dental sealant program. The manual contains valuable information, ranging from defining the population to be served to program evaluation. Twelve appendices contain examples of various assessment, treatment, and parental consent forms. The videos are excellent.

Author/Developer: Nancy L. Carter, R.D.H., M.P.H., Cincinnati Health Department, in cooperation with several national and governmental agencies.

Contact: William R. Hall, D.D.S., M.P.H., Director, National School-Based Oral Health/Dental Sealant Program, The University of Illinois at Chicago, School of Public Health (M/C 922), 2121 W. Taylor Street, Chicago, IL 60612. \$20.

6. **Seal Out Dental Decay.** NIH Publication No. 94-4895. This six-page pamphlet explains why back teeth decay so easily, indicates who should receive sealants and when, and uses drawings to show how they are placed. It stresses that sealants used with fluorides can prevent nearly all tooth decay. A Spanish version, "Cancele Las Caries Dentales," also is available (NIH Publication No. 94-4895).

Author/Developer: National Institute of Dental Research, National Institutes of Health.

Contact: National Institute of Dental Research, P.O. Box 54793, Washington, DC. Free.

## **SECTION 9 HANDOUTS/OVERHEADS**

**Dosage Schedule for Dietary Fluoride Supplements\***  
(in mg of fluoride per day)\*\*

AGE	FLUORIDE ION CONCENTRATION IN DRINKING WATER (ppm)†		
	<u>&lt;0.3 ppm</u>	<u>0.3–0.6 ppm</u>	<u>&gt;0.6 ppm</u>
Birth– 6 months	None	None	None
6 months– 3 years	0.25	None	None
3–6 years	0.5	0.25	None
6–16 years	1.0	0.5	None

\* Recommended (1994) by the American Dental Association, American Academy of Pediatrics and American Academy of Pediatric Dentistry

\*\* 2.2 mg sodium fluoride = 1 mg fluoride

† parts per million; 1.0 ppm = 1 mg/liter

Jakush J. New fluoride schedule adopted: Therapeutics council affirms workshop outcome. *ADA News*. May 16, 1994;25(10):12.

## **Attributes of School-Based Programs of Weekly Fluoride Mouth Rinsing**

- Safe and effective in preventing dental decay
- Relatively inexpensive
- Easy to learn and do
- Nondental personnel can supervise
- Well accepted by participants—good compliance
- Little time required—5 minutes/week

## **Guidelines for Fluoride Dentifrice Use by Preschool-Aged Children to Reduce the Risk of Dental Fluorosis**

- Parents should brush the teeth or closely supervise the brushing of teeth by children younger than age 6.
- Parents should apply the dentifrice to the child's toothbrush.
- A child-size toothbrush should be used.
- Only a pea-size amount of toothpaste should be applied to the toothbrush.
- The child should rinse thoroughly and spit out any remaining toothpaste in the mouth after toothbrushing. Swallowing toothpaste should be avoided.
- Special concern is warranted in fluoridated communities or for children who take dietary fluoride supplements.

## **Roles of Health Professionals in Promoting Oral Health Procedures**

- Support use of valid procedures. Know and advocate the use of preventive methods that are supported by scientific research.
- Provide accurate information for individuals and community decision makers so that they can take appropriate actions to achieve and maintain oral health.
- Foster the initiation of appropriate oral disease preventive programs. Help decision makers make rational choices regarding community oral disease preventive programs and identify financial resources to support the programs.
- Provide consultation and advice. Groups such as Head Start, Parent Teacher Associations, and local health departments often require accurate information and positive reinforcement to support appropriate decisions on community-based, caries-preventive programs.

## **Some Key Facts about Water Fluoridation**

- Fluoride is a naturally occurring element in all water sources.
- Fluoridation merely adjusts the naturally occurring fluoride concentration in a drinking water source to a level that is optimal for oral health.
- Fluoridation provides both systemic and topical benefits to teeth.
- Fluoridation is equitable because it provides benefits to everyone regardless of age, socioeconomic status, or access to dental care.
- Fluoridation is eminently safe. No other health measure has been studied as extensively for safety.
- Dental bills are reduced by half after fluoridation has been in place for several years.
- Public health law applies to the prevention and control of chronic diseases; dental caries is an infectious, chronic disease.
- Although a minority may perceive that individual freedom is curtailed by water fluoridation, the rights of the majority for disease prevention supersedes this concern.

## **Factors That Affect the Outcome of Public Referenda on Community Water Fluoridation**

- Educating the public about the oral health, public health, and economic benefits of fluoridation
- Public distrust of science in areas that affect human health
- Misrepresentation of scientific and technical information by opponents
- Type and timing of the referendum in which the ballot measure is included; a general election generally is preferable to a special or primary election
- Clarity and specificity of the ballot's wording
- Whether the vote is to implement, maintain, or rescind fluoridation
- Visibility and public stature of proponent and opponent leaders
- Active participation by local dental, medical, and other health professionals
- Voting patterns by demographic characteristics, such as social class and age
- Size of the city and regional characteristics



## **Healthy People 2000 Oral Health Objectives Related to This Subtopic**

- 13.8 Increase to at least 50 percent the proportion of children who have received protective sealants on the occlusal (chewing) surfaces of permanent molar teeth. (Baseline: 11 percent of children aged 8, and 8 percent of adolescents aged 14 in 1986–1987.)
- 13.9 Increase to at least 75 percent the proportion of people served by community water systems providing optimal levels of fluoride. (Baseline: 62 percent in 1989.)
- 13.10 Increase use of professionally or self-administered topical or systemic (dietary) fluorides to at least 85 percent of people not receiving optimally fluoridated public water. (Baseline: An estimated 50 percent in 1989.)

U.S. Department of Health and Human Services, Public Health Service. *Healthy People 2000—National Health Promotion and Disease Prevention Objectives*. DHHS Publication No. 91-50212, U.S. Government Printing Office, Washington, DC; 1991.